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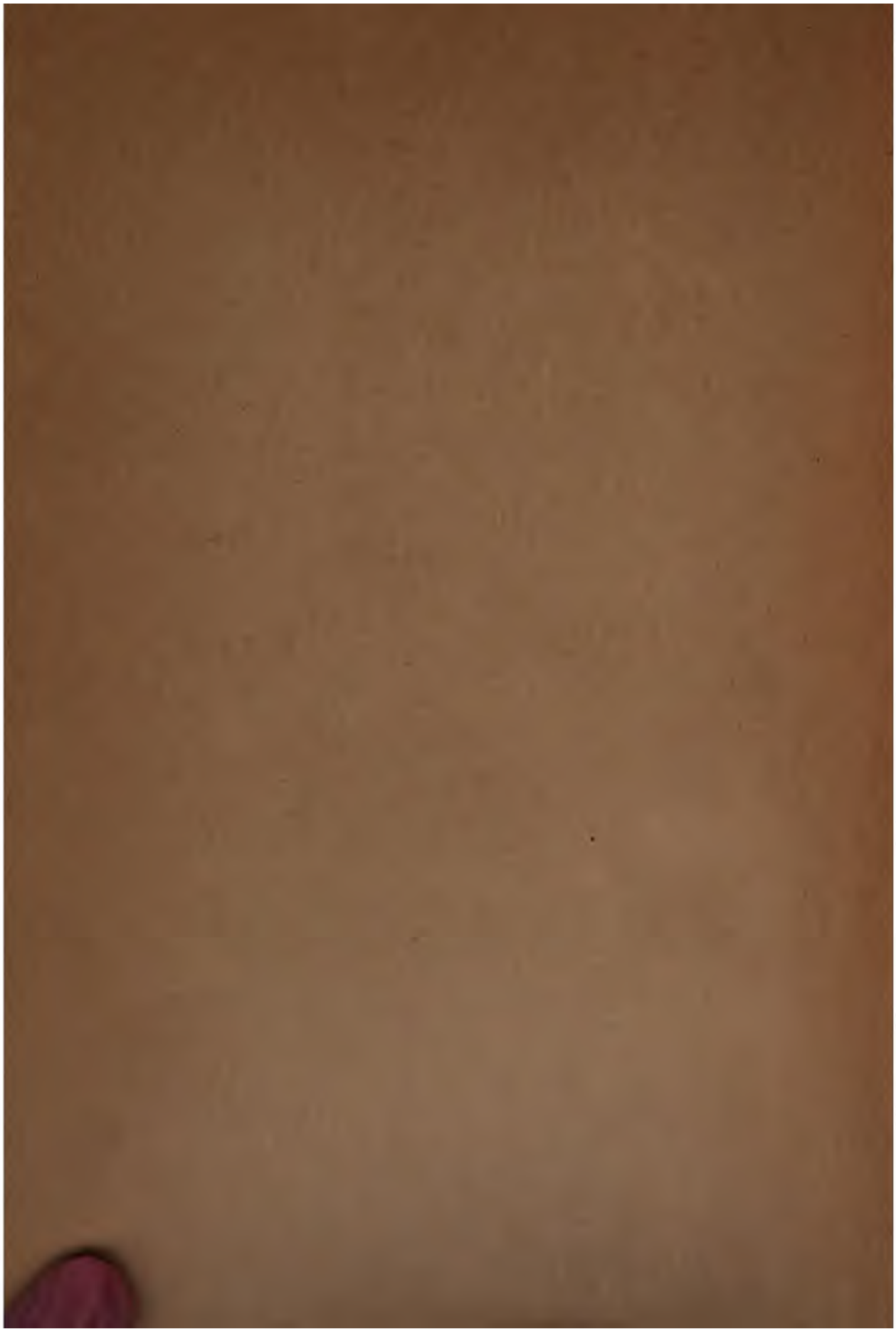

MEMOIRS
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AMERICAN ENTOMOLOGICAL SOCIETY
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THE CRESSON TYPES OF HYMENOPTERA

BY
EZRA TOWNSEND CRESSON

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MEMOIRS
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NUMBER I

THE CRESSON TYPES OF HYMENOPTERA

BY EZRA TOWNSEND CRESSON

This paper contains a complete list of the species of Hymenoptera described by the author, arranged alphabetically under each family, with reference to the original description, sex, number of the type-specimen, as recorded in the catalogue of types in the collection of the American Entomological Society, locality and condition of the specimens as found during the winter of 1913–14; and as the collections are carefully looked after, there is likely no change in their condition at the time of the publication of this paper.

In selecting the single type the author has been governed by the present condition of the original material, and has always selected the perfect, or more nearly perfect specimen.

No notice has been taken of synonymy; the genera, given in parenthesis, after the species, being those under which they were originally described.

Unless otherwise stated, the type-specimens are in the Collection of the American Entomological Society, at the Academy of Natural Sciences, Philadelphia, Pa.

The Belfrage Collection is in the United States National Museum, Washington, D. C., and the author is greatly indebted to Mr. J. C. Crawford and Mr. S. A. Rohwer for data as to type numbers, and condition of the specimens as found by them in August, 1914.

It is the firm recollection of the author that after all the unique specimens had been described and returned to Mr. Belfrage, as he requested they should be, that gentleman, finding a duplicate in his collection of what he considered to be the same species, very generously returned the type-specimen to the Society, after the publication of "Hymenoptera Texana." There are only nine in this category, and reference thereto is made under each of the species in its proper place in this catalogue. The same may be said of Mr. Gundlach, after the publication of "The Hymenoptera of Cuba" in 1865.

The Gundlach Collection of Hymenoptera is in the Museum of the "Instituto de Segunda Enseñanza de la Habana," Obispo Street, Havana, Cuba. Dr. Henry Skinner, Curator of the American Entomological Society, who visited the Museum in 1913, found the collection arranged in thirteen hermetically sealed, glass-top boxes. The specimens appeared to be in good condition, but that of the type-specimens themselves could not be accurately ascertained, although an effort was made to obtain the information.

The Boll Collection is in the Museum of Comparative Zoology, Cambridge, Mass., and Dr. Samuel Henshaw very kindly furnished recent data regarding the types in that collection.

The type-specimens described from the Norton Collection appear to be lost, except a few now in the collection at the Academy of Natural Sciences, Philadelphia, Pa.

In conclusion, the author desires to express his thanks to Dr. Henry Skinner and Mr. E. T. Cresson, Jr., in charge of the Entomological collections at said Academy, for valuable aid given in the preparation of this catalogue.

Types of 2737 species are given in the following list.

At the end of this paper, immediately before the Index, is appended a list of the entomological writings of the author, arranged in chronological order and numbered consecutively, to enable the student to locate the papers in which the types are described. As a further guide the numbers of the papers follow the families in the Index.

TENTHREDINIDAE

abdominalis (Schizocerus), Proc. Ent. Soc. Phil., iv, 243, ♂.
340. Colorado. In good condition.
addenda (Tenthredo), Trans. Am. Ent. Soc., viii, 23, ♀.
284. Colorado. In good condition.
afflictus (Allantus), Trans. Am. Ent. Soc., viii, 17, ♀ ♂.
241 ♀. Nevada. In good condition.
agilis (Nematus), Trans. Am. Ent. Soc., viii, 9, ♂.
370. Nevada. In good condition.
albipes (Mesoneura), Trans. Am. Ent. Soc., viii, 11, ♀.
364. Nevada. Right antenna off.
albiricta (Euura), Trans. Am. Ent. Soc., viii, 4, ♀.
397. Nevada. In good condition.
albomarginata (Lyda), Trans. Am. Ent. Soc., viii, 30, ♀.
308. Colorado. In good condition.
aleutiana (Trichiosoma), Trans. Am. Ent. Soc., viii, 1, ♀.
338. Aleutian Islands, Alaska. In good condition. Described as a variety of *triangulum* Kirby.
americana (Zarea), Trans. Am. Ent. Soc., viii, 1, ♀.
313. California. In good condition.
annulipes (Macrophya), Trans. Am. Ent. Soc., viii, 18, ♀.
246. Nevada. In good condition.
atrata (Lyda), Trans. Am. Ent. Soc., viii, 30, ♂.
310. Nevada. In good condition.
atripes (Lyda), Trans. Am. Ent. Soc. viii, 27, ♀.
298. North Carolina. In good condition.
belfragei (Selandria), Trans. Am. Ent. Soc., viii, 15, ♀.
185. Texas. Left antenna off.
bella (Tenthredo), Trans. Am. Ent. Soc., viii, 21, ♀.
223. Colorado. In good condition.
bicolorata (Macrophya), Trans. Am. Ent. Soc., viii, 19, ♀.
258. California. In good condition.
bipartita (Selandria), Trans. Am. Ent. Soc., viii, 12, ♂.
186. Texas. In good condition.
brunniceps (Lyda), Trans. Am. Ent. Soc., viii, 29, ♀.
306. White Mountains, New Hampshire. Tips of antennae off.
brunniventris (Schizocera), Trans. Am. Ent. Soc., viii, 2, ♀ ♂.
342 ♀. Nevada. Right upper wing off.
bucephala (Lyda), Trans. Am. Ent. Soc., viii, 29, ♂.
304. California. In good condition.
carbonaria (Selandria), Trans. Am. Ent. Soc., viii, 12, ♀.
187. Georgia. In good condition.

cavifrons (Lyda), Proc. Ent. Soc. Phil., iv, 246, ♀.
329. Colorado. In good condition.
coloradensis (Dolerus), Trans. Am. Ent. Soc., viii, 11, ♀.
367. Colorado. In good condition.
corylus (Nematus), Trans. Am. Ent. Soc., viii, 8, ♀.
371. Pennsylvania. Left antenna off.
curialis (Selandria), Trans. Am. Ent. Soc., viii, 15, ♀ ♂.
188 ♀. Mexico. Tip of right antenna off.
decolorata (Selandria), Trans. Am. Ent. Soc., viii, 15, ♂.
189. Colorado. In good condition.
diluta (Selandria), Trans. Am. Ent. Soc., viii, 12, ♀.
190. Canada. In good condition.
diluta (Tenthredo), Trans. Am. Ent. Soc., viii, 24, ♀.
264. California. In good condition.
dimmockii (Nematus), Trans. Am. Ent. Soc., viii, 6, ♀.
372. Mt. Washington, New Hampshire. Tips of antennae and left wings off.
discolor (Lyda), Trans. Am. Ent. Soc., viii, 26, ♀.
294. Canada. Tips of antennae off.
discolor (Nematus), Trans. Am. Ent. Soc., viii, 8, ♀.
373. Colorado. Left antenna off.
dorsivittatus (Nematus), Trans. Am. Ent. Soc., viii, 10, ♀.
374. Nevada. Tip of left antenna off.
dubia (Selandria), Proc. Ent. Soc. Phil., iv, 244, ♀.
191. Colorado. In good condition.
ebenus (Aulacomerus?), Trans. Am. Ent. Soc., viii, 10, ♀.
396. Colorado. Tip of left antenna off.
edwardsii (Nematus), Trans. Am. Ent. Soc., viii, 7, ♀.
375. Marin County, California. In good condition.
edwardsii (Sericocera), Trans. Am. Ent. Soc., viii, 2, ♀ ♂.
316 ♀. Mazatlan, Mexico. In good condition.
edwardsii (Tenthredo), Trans. Am. Ent. Soc., viii, 24, ♀.
263. Nevada. In good condition.
elegantulus (Allantus), Trans. Am. Ent. Soc., viii, 17, ♀ ♂.
238 ♀. Nevada. In good condition.
fascipennis (Lyda), Trans. Am. Ent. Soc., viii, 31, ♀.
321. White Mountains, New Hampshire. Tips of antennae off.
ferrugineipes (Tenthredo), Trans. Am. Ent. Soc., viii, 22, ♀.
230. Colorado. In good condition.
fidus (Strongylogaster), Trans. Am. Ent. Soc., viii, 19, ♀.
269. California. In good condition.
floridana (Selandria), Trans. Am. Ent. Soc., viii, 12, ♂.
192. Haulover, Florida. In good condition.
fulviceps (Lophyrus), Trans. Am. Ent. Soc., viii, 25, ♀.
292. Nevada. In good condition.

gentilis (Selandria), Trans. Am. Ent. Soc., viii, 14, ♂.
193. Colorado. In good condition.
improbus (Emphytus), Trans. Am. Ent. Soc., viii, 11, ♀ ♂.
365 ♀. Nevada. In good condition.
insularis (Lophyrus), Proc. Ent. Soc. Phil., iv, 1, ♂ ♀.
291 ♀. Cuba. Left antenna off.
invita (Schizocera?), Trans. Am. Ent. Soc., viii, 3, ♀.
348. Nevada. In good condition.
iridescens (Nematus), Trans. Am. Ent. Soc., viii, 5, ♂.
376. Nevada. Both antennae off.
irrogata (Selandria), Trans. Am. Ent. Soc., viii, 13, ♀.
194. Colorado. In good condition.
jocularis (Pristiphora), Trans. Am. Ent. Soc., viii, 3, ♀ ♂.
395 ♂. Nevada. Right antenna off.
jugosa (Macrophya), Trans. Am. Ent. Soc., viii, 18, ♂.
248. Knight's Valley, California. In good condition.
krugii (Schizocera), Trans. Am. Ent. Soc., viii, 2, ♂.
341. Porto Rico. In good condition.
lacticincta (Tenthredo), Trans. Am. Ent. Soc., viii, 21, ♀ ♂.
221 ♀. Nevada. In good condition.
lateralis (Lophyrus), Trans. Am. Ent. Soc., viii, 25, ♀.
286. Georgia. Right antenna off.
lateraria (Tenthredo), Trans. Am. Ent. Soc., viii, 23, ♀.
215. San Mateo County, California. In good condition.
latifasciatus (Nematus), Trans. Am. Ent. Soc., viii, 7, ♀.
377. White Mountains, New Hampshire. Antennae broken.
latus (Nematus), Trans. Am. Ent. Soc., viii, 4, ♀.
378. Nevada. In good condition.
lenis (Selandria), Trans. Am. Ent. Soc., viii, 14, ♂.
195. Colorado. In good condition.
limbatus (Allantus), Trans. Am. Ent. Soc., viii, 17, ♀.
240. California. In good condition.
limbatus (Nematus), Trans. Am. Ent. Soc., viii, 8, ♀.
379. Illinois. In good condition.
luteipes (Dineura), Trans. Am. Ent. Soc., viii, 11, ♂.
363. Maine. In good condition.
luteipes (Nematus), Trans. Am. Ent. Soc., viii, 6, ♀.
380. Nevada. Tip of right antenna off.
luteipes (Tenthredo), Trans. Am. Ent. Soc., viii, 21, ♀.
224. Nevada. In good condition.
luteomaculata (Lyda), Trans. Am. Ent. Soc., viii, 28, ♀.
299. White Mountains, New Hampshire. In good condition.
major (Xyela), Trans. Am. Ent. Soc., viii, 34, ♀ ♂.
330 ♀. Texas. In good condition.

marginiventris (Lyda), Trans. Am. Ent. Soc., viii, 29, ♀.
307. New York. In good condition.
maura (Macrophya), Trans. Am. Ent. Soc., viii, 18, ♀.
247. Nevada. In good condition.
maura (Schizocera), Trans. Am. Ent. Soc., viii, 3, ♂.
345. Nevada. In good condition.
melliceps (Lophyrus), Trans. Am. Ent. Soc., viii, 26, ♀.
2793. Massachusetts. In good condition.
mellina (Hylotoma), Trans. Am. Ent. Soc., viii, 3, ♀.
354. Nevada. In good condition.
mellinus (Nematus), Trans. Am. Ent. Soc., viii, 10, ♀.
381. Nevada. Left antenna off.
melliventris (Lyda), Trans. Am. Ent. Soc., viii, 32, ♂.
325. Nevada. In good condition.
mexicana (Ptilia), Trans. Am. Ent. Soc., viii, 3, ♂.
349. Mexico. In good condition.
militaris (Nematus), Trans. Am. Ent. Soc., viii, 7, ♀.
382. White Mountains, New Hampshire. Tip of right antenna off.
mimula (Tenthredo), Trans. Am. Ent. Soc., viii, 23, ♂.
211. Colorado. In good condition.
montana (Selandria), Proc. Ent. Soc. Phil., iv, 244, ♀.
196. Colorado. In good condition.
montivaga (Lyda), Trans. Am. Ent. Soc., viii, 28, ♂.
301. Nevada. In good condition.
montivaga (Selandria), Trans. Am. Ent. Soc., viii, 13, ♀.
197. Nevada. In good condition.
morosa (Tenthredo), Trans. Am. Ent. Soc., viii, 23, ♂.
232. Colorado. In good condition.
morrisoni (Lyda), Trans. Am. Ent. Soc., viii, 27, ♀.
297. Nevada. In good condition.
nevadensis (Allantus), Trans. Am. Ent. Soc., viii, 17, ♀.
242. Nevada. In good condition.
nevadensis (Lyda), Trans. Am. Ent. Soc., viii, 28, ♂.
300. Nevada. In good condition.
nevadensis (Nematus), Trans. Am. Ent. Soc., viii, 9, ♀ ♂.
383 ♀. Nevada. In good condition.
nevadensis (Selandria), Trans. Am. Ent. Soc., viii, 13, ♀ ♂.
198 ♀. Nevada. In good condition.
nigella (Selandria), Trans. Am. Ent. Soc., viii, 12, ♀.
199. Nevada. In good condition.
nigriceps (Allantus), Trans. Am. Ent. Soc., viii, 16, ♀ ♂.
237 ♀. Nevada. In good condition.
nigripes (Lyda), Trans. Am. Ent. Soc., viii, 28, ♂.
302. Nevada. Right antenna off beyond joint four.

nigrita (Lyda), Trans. Am. Ent. Soc., viii, 30, ♂.
309. Nevada. In good condition.
nigrofemoratus (Nematus), Trans. Am. Ent. Soc., viii, 4, ♀.
384. Nevada. Tip of right antenna off.
nigropectus (Lyda), Trans. Am. Ent. Soc., viii, 32, ♀.
323. Nevada. In good condition.
nigropectus (Nematus), Trans. Am. Ent. Soc., viii, 6, ♀.
385. Nevada. Tips of antennae off.
nimbipennis (Tenthredo), Trans. Am. Ent. Soc., iv, 155, ♀.
217. Texas. In good condition.
notabilis (Nematus), Trans. Am. Ent. Soc., viii, 7, ♀.
386. Massachusetts. Both antennae off.
nupera (Tenthredo), Trans. Am. Ent. Soc., viii, 22, ♂.
227. Nevada. Both antennae imperfect.
obscurata (Selandria), Trans. Am. Ent. Soc., viii, 15, ♂ ♀.
200 ♀. Colorado. Right antenna off.
obscuripennis (Tenthredo), Trans. Am. Ent. Soc., viii, 20, ♀.
203. Sierra Nevada, California. In good condition.
occidaneus (Allantus), Trans. Am. Ent. Soc., viii, 18, ♀.
243. Colorado. In good condition.
occidentalis (Tenthredo), Trans. Am. Ent. Soc., viii, 23, ♀.
214. Colorado. In good condition.
ochreipes (Lyda), Trans. Am. Ent. Soc., viii, 30, ♀.
318. White Mountains, New Hampshire. In good condition.
opimus (Allantus), Trans. Am. Ent. Soc., viii, 15, ♀ ♂.
369 ♀. Vancouver Island, British Columbia. In good condition.
oregona (Macrophya), Trans. Am. Ent. Soc., viii, 19, ♀.
252. Oregon. Left antenna broken.
ornaticeps (Allantus), Trans. Am. Ent. Soc., viii, 16, ♀ ♂.
236 ♀. Nevada. In good condition.
pacifica (Cimbex), Trans. Am. Ent. Soc., viii, 51, ♀.
336. Washington Territory. In good condition.
pallifrons (Nematus), Trans. Am. Ent. Soc., viii, 6, ♂.
387. Texas. In good condition.
palliventris (Nematus), Trans. Am. Ent. Soc., viii, 5, ♀.
388. Nevada. Both antennae broken.
parca (Selandria), Trans. Am. Ent. Soc., viii, 13, ♂.
357. Texas. In good condition.
parva (Selandria), Trans. Am. Ent. Soc., viii, 12, ♂.
358. Colorado. In good condition.
parvula (Tenthredo), Trans. Am. Ent. Soc., viii, 22, ♂.
225. California. Right antenna off.
parvus (Nematus), Trans. Am. Ent. Soc., viii, 5, ♀.
389. Nevada. Tips of both antennae off.

pectoralis (Nematus), Trans. Am. Ent. Soc., viii, 9, ♀.
390. Nevada. Tip of left antenna off.
perplexa (Lyda), Trans. Am. Ent. Soc., viii, 31, ♀.
320. Massachusetts. In good condition.
pleuralis (Tenthredo), Proc. Ent. Soc. Phil., iv, 245, ♀ ♂.
219 ♀. Colorado. In good condition.
politus (Strongylogaster), Trans. Am. Ent. Soc., viii, 20, ♀.
274. Canada. In good condition.
pullata (Lyda), Trans. Am. Ent. Soc., viii, 31, ♀.
319. Missouri. Posterior tarsus broken.
rapax (Nematus), Trans. Am. Ent. Soc., viii, 4, ♂.
391. Nevada. Both antennae broken and right upper wing off.
rileyi (Lophyrus), Trans. Am. Ent. Soc., viii, 25, ♀.
289. Florida. Tip of right antenna off.
rileyi (Lyda), Trans. Am. Ent. Soc., viii, 32, ♀.
328. Missouri. Both antennae broken.
rileyi (Selandria), Trans. Am. Ent. Soc., viii, 13, ♀.
359. Missouri. Right antenna off.
rubella (Tenthredo), Trans. Am. Ent. Soc., viii, 22, ♂.
228. Nevada. In good condition.
rubens (Tenthredo), Trans. Am. Ent. Soc., viii, 24, ♂.
260. Nevada. In good condition.
rubeola (Tenthredo), Trans. Am. Ent. Soc., viii, 23, ♂.
210. Nevada. In good condition.
rubida (Cimbex), Trans. Am. Ent. Soc., viii, 1, ♂ ♀.
337 ♀. Nevada. In good condition.
rubripes (Strongylogaster), Trans. Am. Ent. Soc., viii, 20, ♀.
273. Colorado. Left upper wing off.
rufiventris (Lyda), Trans. Am. Ent. Soc., viii, 29, ♂.
303. Nevada. In good condition.
rufocincta (Lyda), Trans. Am. Ent. Soc., viii, 32, ♂.
326. Colorado. In good condition.
ruralis (Nematus), Trans. Am. Ent. Soc., viii, 5, ♀.
392. Nevada. Both antennae broken.
scaevola (Tenthredo), Trans. Am. Ent. Soc., viii, 20, ♀.
222. Nevada. In good condition.
scelesta (Selandria), Trans. Am. Ent. Soc., viii, 14, ♂.
360. Nevada. In good condition.
sectilis (Tenthredo), Trans. Am. Ent. Soc., viii, 22, ♀.
231. Nevada. In good condition.
semidea (Cimbex), Trans. Am. Ent. Soc., viii, 1, ♀.
335. White Mountains, New Hampshire. In good condition.
semidea (Lyda), Trans. Am. Ent. Soc., viii, 31, ♀.
322. Mt. Washington, New Hampshire. In good condition.
similaris (Lyda), Trans. Am. Ent. Soc., viii, 27, ♀.
296. Nevada. In good condition.

sodalis (Selandria), Trans. Am. Ent. Soc., viii, 14, ♀.
361. Colorado. Right upper wing off.
soriculatipes (Strongylogaster), Trans. Am. Ent. Soc., viii, 20, ♀.
275. Illinois. Tip of right antenna off.
spissipes (Selandria), Trans. Am. Ent. Soc., viii, 14, ♀.
362. Colorado. Right hind tibia and tarsus off.
stramineipes (Emphytus), Trans. Am. Ent. Soc., viii, 52, ♀.
366. Washington Territory. Right antenna broken.
suadus (Nematus), Trans. Am. Ent. Soc., viii, 10, ♀.
393. White Mountains, New Hampshire. In good condition.
suavis (Tenthredo), Trans. Am. Ent. Soc., viii, 21, ♂.
235. Nevada. In good condition.
subviolacea (Macrophya), Trans. Am. Ent. Soc., viii, 18, ♀.
251. California. Both antennae broken.
succincta (Macrophya), Trans. Am. Ent. Soc., viii, 19, ♀.
257. Georgia. Left antenna off.
suffusus (Lophyrus), Trans. Am. Ent. Soc., viii, 26, ♀.
2794. Massachusetts. In good condition.
terminalis (Lyda), Trans. Am. Ent. Soc., viii, 29, ♀.
305. Nevada. In good condition.
texana (Macrophya), Trans. Am. Ent. Soc., viii, 52, ♀ ♂.
245 ♀. Texas. In good condition.
tibialis (Dolerus), Trans. Am. Ent. Soc., viii, 52, ♂.
368. Washington Territory. In good condition.
tibialis (Strongylogaster), Trans. Am. Ent. Soc., viii, 19, ♀.
272. Nevada. Left antenna with flagellum off.
tristis (Schizocera), Trans. Am. Ent. Soc., viii, 52, ♀ ♂.
344 ♀. Washington Territory. Left upper wing off.
verticalis (Lyda), Trans. Am. Ent. Soc., viii, 26, ♀.
295. California. Apical half of left antenna and posterior tarsus off.
vicinalis (Nematus), Trans. Am. Ent. Soc., viii, 4, ♀.
394. California. Right antenna off.
vittatipes (Tenthredo), Trans. Am. Ent. Soc., viii, 24, ♂.
285. Nevada. In good condition.

UROCERIDAE

abdominalis (Cephus), Trans. Am. Ent. Soc., viii, 33, ♀.
531. Nevada. In good condition. Name preoccupied by Latreille; renamed *cressoni* by Kirby.
areolatus (Urocerus), Trans. Am. Ent. Soc., i, 375, fig., ♀.
521. New Mexico. In good condition.
behrensii (Urocerus), Trans. Am. Ent. Soc., viii, 35, ♀.
522. California. Both antennae off, and legs more or less broken.
bifasciatus (Cephus), Trans. Am. Ent. Soc., viii, 33, ♀.
532. Colorado. In good condition.

caeruleus (Urocerus), Trans. Am. Ent. Soc., viii, 34, ♀.
523. Vancouver Island, British Columbia. In good condition.
caudatus (Urocerus), Proc. Ent. Soc. Phil., iv, 247, ♀.
524. Colorado. Right hind tarsus off.
cubensis (Tremex), Proc. Ent. Soc. Phil., iv, 2, ♀.
528. Cuba. Both antennae broken.
fasciatus (Cephus), Trans. Am. Ent. Soc., viii, 33, ♀.
533. Colorado. Both antennae and left hind wing off.
fulvus (Urocerus), Trans. Am. Ent. Soc., viii, 35, ♂.
525. Colorado. In good condition.
latitarsus (Tremex), Proc. Ent. Soc. Phil., iv, 3, ♂, fig. 1.
529. Cuba. Left hind leg off.
mexicanus (Oryssus), Proc. Ent. Sec. A. N. S., 1879, x, ♀.
398. Mexico. Both antennae off.
morrisoni (Urocerus), Trans. Am. Ent. Soc., viii, 35, ♀ ♂.
526 ♀. Colorado. In good condition.
occidentalis (Oryssus), Proc. Ent. Sec. A. N. S., 1879, ix, ♂ ♀.
399 ♀. Colorado. In good condition.
rufiventris (Cephus), Trans. Am. Ent. Soc., viii, 33, ♀.
534. Napa County, California. Tip of left antenna, and right anterior wing off.
rufiventris (Xiphydria), Trans. Am. Ent. Soc., viii, 34, ♀.
530. New York. In good condition.
tarsalis (Urocerus), Trans. Am. Ent. Soc., viii, 52, ♀.
527. Washington Territory. In good condition.

CYNIPIDAE

armatus (Cynips?), Proc. Ent. Soc. Phil., iv, 4, ♀, fig. 2.
535. Cuba. In fair condition.
basalis (Eucoila?), Proc. Ent. Soc. Phil., iv, 5.
Cuba. Type in Gundlach Collection.
bifoveolata (Aspicera), Proc. Ent. Soc. Phil., iv, 7, ♀.
Cuba. In Gundlach Collection.
carinata (Eucoila?), Proc. Ent. Soc. Phil., iv, 6, ♀?.
Cuba. In Gundlach Collection.
montana (Ibalia), Proc. Ent. Sec. A. N. S., 1879, xvii, ♀.
536. Colorado. In good condition.
rufipes (Aspicera), Proc. Ent. Soc. Phil., iv, 6, ♂.
Cuba. In Gundlach Collection.
rufipes (Ibalia), Proc. Ent. Sec. A. N. S., 1879, xvii, ♀.
537. Nevada. In good condition.

EVANIIDAE

abdominalis (Aulacus), Proc. Ent. Sec. A. N. S., 1880, v, ♀.
Georgia. Type not found.

consors (Aulacus), Trans. Am. Ent. Soc., vii, 255, ♂.
538. Nevada. Left antenna off.

editus (Aulacus), Proc. Ent. Sec. A. N. S., 1880, v, ♀.
539. Nevada. In fair condition.

firmus (Aulacus), Trans. Am. Ent. Soc., vii, 256, ♀.
540. Colorado. Both antennae broken.

incertus (Foenus), Proc. Ent. Soc. Phil., iii, 133, ♀ ♂.
909 ♀. Colorado. Both antennae broken.

melleus (Aulacus), Trans. Am. Ent. Soc., vii, 255, ♀.
541. Nevada. In good condition.

minor (Aulacus), Proc. Ent. Sec. A. N. S., 1880, vi, ♀ ♂.
542 ♀. Nevada. Both antennae off.

montanus (Aulacus), Trans. Am. Ent. Soc., vii, 256, ♀.
543. Nevada. Antennae and legs more or less broken.

montanus (Foenus), Proc. Ent. Soc. Phil., iii, 132, ♀.
910. Colorado. In good condition.

nigriventris (Aulacodes), Proc. Ent. Soc. Phil., iv, 9, fig. 3, ♀.
Cuba. Type (♀) in the Gundlach Collection. A ♂ specimen in the Society's collection, also from Cuba, in good condition, except extreme tips of antennae are off.

occidentalis (Aulacus), Trans. Am. Ent. Soc., vii, 255, ♀.
544. Colorado. Tips of both antennae off.

occidentalis (Foenus), Proc. Ent. Soc. Phil., iii, 131, ♀.
911. Colorado. Tips of both antennae off.

pacificus (Aulacus), Trans. Am. Ent. Soc., vi, 256, ♀.
904. Vancouver Island, British Columbia. In good condition.

pallipes (Aulacus), Proc. Ent. Sec. A. N. S., 1879, xvii, ♂.
905. Massachusetts. Both antennae and all the wings except right hind one, off.

perplexus (Foenus), Proc. Ent. Soc. Phil., iii, 131, ♀.
912. Colorado. In good condition.

rufitarsis (Aulacus), Proc. Ent. Soc. Phil., iii, 134, ♀.
907. Colorado. Anterior wings frayed at tips.

semirubra (Evania), Proc. Ent. Soc. Phil., iv, 8, ♂ ♀.
908 ♂. Cuba. Antennae and legs more or less broken; ♀ in Gundlach Collection.

stigmaterus (Aulacus), Proc. Ent. Soc. Phil., iii, 134, ♀.
906. New Jersey. Antennae more or less broken.

TRIGONALIDAE

costalis (Trigonalys), Proc. Ent. Soc. Phil., vi, 352, ♂.
913. Massachusetts. In good condition.
gundlachii (Trigonalys), Proc. Ent. Soc. Phil., iv, 10, ♂.
Cuba. In Gundlach Collection.
laeviceps (Trigonalys), Proc. Ent. Sec. A. N. S., 1879, vii, ♀.
914. Mexico. In good condition.
mexicanus (Trigonalys), Proc. Ent. Sec. A. N. S., 1879, vii, ♂.
915. Mexico. Antennae and right upper wing off.
nevadensis (Trigonalys), Proc. Ent. Sec. A. N. S., 1879, vii, ♀ ♂.
916 ♀. Nevada. In good condition.
pulchellus (Trigonalys), Proc. Ent. Soc. Phil., vi, 351, ♂.
West Virginia. Not found.

ICHNEUMONIDAE

abactus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 127, ♂.
723. Mirador, Mexico. Right upper wing off.
abactus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 160, ♀.
798. Mirador, Mexico. Head off.
abaculus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 124, ♂.
703. Orizaba, Mexico. In good condition.
abdominalis (Christolia), Proc. Acad. Nat. Sci., 1873, 165, ♀.
810. Orizaba, Mexico. In good condition.
abdominalis (Cteniscus), Proc. Ent. Soc. Phil., iv, 264, ♀.
1339. Colorado. Posterior legs off.
abdominalis (Echthrus), Can. Ent. i, 37, ♀.
1530. Ottawa, Ontario, Canada. Tip of left antenna off.
abdominalis (Exetastes), Proc. Ent. Soc. Phil., iv, 276, ♀.
1612. Colorado. In good condition.
abdominalis (Ischnocerus), Proc. Ent. Soc. Phil., iv, 25, ♀.
Cuba. In Gundlach Collection.
abdominalis (Odontomerus), Proc. Ent. Soc. Phil., iv, 289, ♀.
1527. Colorado. In good condition.
abitus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 125, ♂.
704. Cordova, Mexico. Right antenna broken.
abjectus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 122, ♂.
697. Cordova, Mexico. Tips of antennae, apex of abdomen and venter wanting.
ablatus (Polyaenus), Proc. Acad. Nat. Sci., 1873, 149, ♀.
778. Orizaba, Mexico. Extreme tips of antennae, also left anterior and posterior legs, off.

ablutus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 113, ♀.
663. Orizaba, Mexico. Middle left leg off.
abnormis (Hoplismenus), Trans. Am. Ent. Soc., ii, 26, ♀.
733. Cordova, Mexico. In good condition.
absolutus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 158, ♀.
794. Cordova, Mexico. In good condition.
acceptus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 154, ♀.
784. Orizaba, Mexico. Extreme tip of right antenna off.
acclivus (Hoplismenus), Trans. Am. Ent. Soc., ii, 25, ♂.
728. Cordova, Mexico. In good condition.
accolens (Mesostenus), Proc. Acad. Nat. Sci., 1873, 159, ♀.
795. Mirador, Mexico. In good condition.
accuratus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 147, ♀.
772. Mirador, Mexico. In good condition.
acerbus (Ichneumon), Trans. Am. Ent. Soc., i, 293, ♂.
919. Illinois. In good condition.
acerbus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 144, ♀.
765. Orizaba, Mexico. In good condition.
aciculata (Joppa?), Trans. Am. Ent. Soc., ii, 30, ♀ ♂.
739 ♀. Cordova, Mexico. In good condition.
acolhua (Cryptanura), Proc. Acad. Nat. Sci., 1873, 167, ♀.
813. Orizaba, Mexico. In good condition.
actuosus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 117, ♂.
675. Orizaba, Mexico. In good condition.
additus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 114, ♂.
666. Orizaba, Mexico. Both antennae broken, also hind tarsi; tip of abdomen and venter wanting.
adjicialis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 172, ♀.
821. Orizaba, Mexico. In good condition.
admirabilis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 175, ♀.
828. Cordova, Mexico. In good condition.
admirandus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 155, ♀.
788. Orizaba, Mexico. In good condition.
admonitus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 160, ♂.
799. Orizaba, Mexico. Both antennae broken.
admotus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 156, ♀.
790. Orizaba, Mexico. Tip of left antenna off.
adultus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 173, ♀.
822. Orizaba, Mexico. Extreme tips of antennae and left posterior wing, off.
aethiops (Odontomerus), Proc. Ent. Soc. Phil., iv, 289, ♀ ♂.
1524 ♀. Colorado. Both antennae off.
aethiops (Tryphon), Trans. Am. Ent. Soc., ii, 106, ♀.
1280. Massachusetts. Both antenna, and wings, except left posterior, off.

afer (Ichneumon), Proc. Ent. Soc. Phil., iii, 138, ♀.
1282. Illinois. In good condition.
affinis (Exetastes), Proc. Ent. Soc. Phil., iv, 277, ♀.
1614. Colorado. In good condition.
affinis (Mesoleptus), Proc. Ent. Soc. Phil., iii, 263, ♂.
1580. Illinois. In good condition.
affinis (Thyreodon) Proc. Ent. Soc. Phil., iv, 46, ♂.
Cuba. In Gundlach Collection.
affinis (Tryphon), Proc. Ent. Soc. Phil., iii, 277, ♀.
Pennsylvania. Not found. Specimens in the Society's Collection from Massachusetts, New York and Delaware, in good condition.
agilis (Bassus), Trans. Am. Ent. Soc., ii, 111, ♂.
1167. Illinois. In good condition.
agilis (Eurylabus), Trans. Am. Ent. Soc., vi, 201, ♀ ♂.
1243 ♀. New York. In good condition.
agilis (Lampronota), Trans. Am. Ent. Soc., iii, 164, ♀.
1491. Pennsylvania. Left antenna broken.
agilis (Mesochorus), Proc. Ent. Soc. Phil., iv, 266, ♀.
1593. Colorado. In good condition.
agilis (Porizon?), Trans. Am. Ent. Soc. iv, 175, ♀.
Texas. In Belfrage Collection; type No. 1591, U. S. N. M. "Tip of right antenna gone."
agnatum (Anomalon), Proc. Acad. Nat. Sci., 1873, 379, ♂.
839. Mirador, Mexico. Tips of antennae off.
agnitus (Ichneumon), Proc. Ent. Soc. Phil., iii, 151, ♀.
920. Delaware. Tips of antennae off.
alacris (Cryptus), Proc. Ent. Soc. Phil., iii, 306, ♀.
1125. Illinois. In good condition.
albicollaris (Cryptus), Trans. Am. Ent. Soc., iv, 158, ♀.
1126. Comal County, Texas. In good condition.
albifrons (Mesoleptus), Trans. Am. Ent. Soc., ii, 98, ♀.
1392. Connecticut. Right antenna off.
albipennis (Porizon), Proc. Ent. Soc. Phil., iv, 287, ♀.
1594. Colorado. In good condition.
albipes (Ephialtes), Trans. Am. Ent. Soc. iii, 143, ♀.
1538. New Jersey. Right antenna broken.
albipes (Pimpla), Proc. Acad. Nat. Sci., 1873, 399, ♀.
607. Orizaba, Mexico. Left antenna off.
albirictus (Phygadeuon), Proc. Acad. Nat. Sci., 1878, 358, ♂.
1234. California. In fair condition.
albitarsis (Cryptus), Proc. Ent. Soc. Phil., iii, 300, ♂.
1127. Delaware. In good condition.
albitarsis (Ischnus), Proc. Ent. Soc. Phil., iii, 194, ♂.
1246. Illinois. Tip of right antenna off.

albipes (Polysphincta), Rep. Ent. U. S. Dep. Ag., 1879, 208, ♂.
Rock Ledge, Florida. Not found. Not in U. S. Nat. Museum.

albocollaris (Mesoleptus), Trans. Am. Ent. Soc., ii, 100, ♂.
1342. Illinois. Antenna and legs more or less broken.

albomaculata (Rhyssa), Proc. Ent. Soc. Phil., iii, 318, ♀.
1438. New Jersey. In good condition.

albomaculatus (Mesostenus), Proc. Ent. Soc. Phil., iii, 313, ♀.
1168. Pennsylvania. Right antenna, and left tarsus, off.

albomarginata (Glypta), Trans. Am. Ent. Soc., iii, 157, ♀.
1465. Maine. In good condition.

albomarginatus (Ichneumon), Trans. Am. Ent. Soc., i, 297, ♂.
921. Mississippi. Tip of right antenna, and also right hind leg, off.

albopicta (Glypta), Proc. Acad. Nat. Sci., 1873, 405, ♂.
633. Orizaba, Mexico. In good condition.

albopictus (Mesostenus), Proc. Ent. Soc. Phil., iii, 312, ♂.
1169. Delaware. In good condition. Name preoccupied; renamed *delawarensis* by Dalla Torre.

albopictus (Xylonomus), Trans. Am. Ent. Soc., iii, 168, ♀.
1518. New York. Tips of antennae, and also right hind leg, off.

alboricta (Pimpla), Trans. Am. Ent. Soc., iii, 147, ♂.
1426. Delaware. In good condition.

albovarius (Trogus), Proc. Ent. Soc. Phil., iv, 20, ♀.
898. Cuba. Left antenna, and also tip of right antenna, off.

aleutianus (Mesoleius?), Proc. Acad. Nat. Sci., 1878, 371, ♂.
1410. Aleutian Islands, Alaska. Upper left wing, and also abdomen and hind legs, off.

allapsus (Ichneumon), Proc. Ent. Soc. Phil., iv, 256, ♂.
922. Colorado. In good condition.

alternata (Epirhyssa), Proc. Ent. Soc. Phil., iv, 40, ♂.
600. Cuba. Left antenna off.

alternatus (Meniscus?), Proc. Acad. Nat. Sci., 1873, 410, ♂.
643. Cordova, Mexico. Both anterior legs broken, and left posterior leg, except coxa, off.

alternatus (Pezomachus), Can. Ent., iv, 64, ♀.
1203. Illinois. In good condition.

alvarado (Ichneumon), Trans. Am. Ent. Soc., ii, 7, ♂.
706. Cordova, Mexico. In good condition.

ambiguus (Ichneumon), Proc. Ent. Soc. Phil., iii, 161, ♂.
1436. Pennsylvania. In good condition.

amecus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 123, ♂.
701. Mirador, Mexico. In good condition.

americana (Lampronota), Trans. Am. Ent. Soc., iii, 164, ♀.
1488. Illinois. In good condition.

americanus (Cryptus), Proc. Ent. Soc. Phil., iii, 297, ♀.
1128. Delaware. In good condition.
americanus (Euxorides), Trans. Am. Ent. Soc., iii, 167, ♀.
1517. Pennsylvania. In good condition.
americanus (Mesochorus), Can. Ent., iv, 23, ♀.
1582. Delaware. In good condition.
americanus (Mesostenus), Can. Ent., x, 209, ♀.
1170. Maine. In good condition.
americanus (Stilpnus), Trans. Am. Ent. Soc., ii, 95, ♂ ♀.
1230 ♀. New Jersey. Left antenna off.
americanus (Tryphon), Proc. Ent. Soc. Phil., iii, 276, ♂.
1373. Delaware. In good condition.
amoenus (Arotes), Can. Ent., i, 34, ♀.
1434. Canada. In good condition.
amoenus (Hemiteles), Proc. Ent. Soc. Phil., iv, 23, ♀.
Cuba. In Gundlach Collection.
analis (Tryphon), Proc. Ent. Soc. Phil., iii, 279, ♂.
1354. Pennsylvania. Left antenna off.
anceps (Ichneumon), Trans. Am. Ent. Soc., i, 309, ♂ ♀.
918 ♀. Delaware. In good condition.
anguina (Grotea), Proc. Ent. Soc. Phil., iii, 397–398, ♀ ♂, fig. 1.
1533 ♀. New Jersey. Tip of left antenna off.
anguina (Mesoleptus?), Proc. Acad. Nat. Sci. 1873, 391, ♀.
2661. Orizaba, Mexico. In good condition.
angulatus (Cryptus), Proc. Acad. Nat. Sci., 1873, 136, ♀.
754. Cordova, Mexico. Extreme tips of antennae off.
animatus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 161, ♀.
801. Orizaba, Mexico. In good condition.
animosa (Glypta), Trans. Am. Ent. Soc., iii, 154, ♀.
1449. New York. In good condition.
animosa (Pimpla), Trans. Am. Ent. Soc., iv, 165, ♀.
Texas. Belfrage Collection. "Not found."
animosus (Ichneumon), Proc. Ent. Soc. Phil., iii, 164, ♂.
923. Colorado. Left antenna off.
annulata (Eiphosoma), Proc. Ent. Soc. Phil., iv, 54, ♀ ♂.
893 ♀. Cuba. Tips of antennae and of hind tarsi off.
annulatus (Phygadeuon), Proc. Ent. Soc. Phil., iii, 308, ♀.
1216. Delaware. In good condition.
annulicornis (Pimpla), Trans. Am. Ent. Soc., iii, 147, ♀ ♂.
1638 ♂. Illinois. In good condition.
annulipes (Clistopyga), Trans. Am. Ent. Soc., iii, 150, ♀.
1443. Massachusetts. Thorax crushed in pinning.
annulipes (Cteniscus), Trans. Am. Ent. Soc., ii, 112, ♂.
1334. Massachusetts. In good condition.

annulipes (Ichneumon), Proc. Ent. Soc. Phil., iii, 170, ♀.
Delaware. Not found.

annulipes (Mesoleptus), Proc. Ent. Soc. Phil., iii, 257, ♀.
2666. Canada West. Left posterior tarsus off.

annulipes (Tryphon), Trans. Am. Ent. Soc., ii, 108, ♀.
1365. Great Slave Lake, Hudson Bay Territory. Abdomen off.

antennatus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 272, ♂.
1401. Delaware. In good condition.

antennatus (Nonnus), Proc. Acad. Nat. Sci., 1873, 387, ♀ ♂.
860 ♀. Orizaba, Mexico. In good condition.

apertus (Ichneumon), Trans. Am. Ent. Soc., i, 293, ♀.
924. Illinois. Right anterior wing off.

apicale (Joppidium), Trans. Am. Ent. Soc., iv, 160, ♀.
1264. Comal County, Texas. In good condition.

apicalis (Ceratosoma), Proc. Ent. Soc. Phil., iv, 282, ♀ ♂.
1621 ♀. Colorado. Tip of right antenna off.

apicalis (Cremastus), Proc. Ent. Soc. Phil., iv, 286, ♀.
1551. Colorado. In good condition. Described as a variety of *fulvescens* Cresson.

apicalis (Exochus) Proc. Ent. Soc. Phil., iii, 285, ♂.
1317. Illinois. In good condition.

apicalis (Ichneumon), Proc. Ent. Soc. Phil., iii, 152, ♂.
925. Colorado. In good condition.

apicalis (Labena), Proc. Ent. Soc. Phil., iii, 402, ♂.
1532. Delaware. Head off.

apicalis (Lycorina?), Proc. Acad. Nat. Sci., 1873, 407, ♀.
635. Cordova, Mexico. In good condition.

apicalis (Porizon), Proc. Ent. Soc. Phil., iv, 48, ♂.
Cuba. In Gundlach Collection.

apicalis (Trogus), Trans. Am. Ent. Soc., vi, 197, ♀.
1255. Georgia. In good condition.

aquilonia (Pimpla), Trans. Am. Ent. Soc., iii, 145, ♂.
1421. Maine. Right antenna broken.

arctus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 162, ♂.
804. Orizaba, Mexico. Antennae broken.

arcuatus (Cryptus), Proc. Acad. Nat. Sci., 1873, 135, ♀.
752. Orizaba, Mexico. Apical half of left antenna off.

arcuatus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 156, ♀.
789. Orizaba, Mexico. Tip of left antenna off.

ardens (Joppidium), Proc. Acad. Nat. Sci., 1873, 139, ♀ ♂.
758. ♀. Mexico. In good condition.

argentifrons (Mesoleptus), Proc. Ent. Soc. Phil., iii, 261, ♂.
1577. Illinois. In good condition.

arista (Ichneumon), Trans. Am. Ent. Soc., ii, 16, ♂.
682. Cordova, Mexico. In good condition.

arrogans (Ichneumon), Proc. Acad. Nat. Sci., 1873, 115, ♀ ♂.
669 ♀. Orizaba, Mexico. In good condition.

articulatus (Tryphon), Trans. Am. Ent. Soc., ii, 110, ♀.
1344. Hudson Bay Territory. Right wings off.

arvalis (Mesostenus), Trans. Am. Ent. Soc., iv, 163, ♀.
1171. Texas. In good condition.

assiduus (Mesoleptus), Trans. Am. Ent. Soc., ii, 97, ♂.
1406. Massachusetts. Right antenna broken.

ater (Ichneumon), Proc. Ent. Soc. Phil., iii, 138, ♀.
926. New York. Tip of right antenna off.

ater (Phaeogenes), Trans. Am. Ent. Soc., vi, 202, ♀.
1257. Missouri. Left anterior wing off.

atratus (Nonnus), Proc. Acad. Nat. Sci., 1873, 387, ♀.
859. Cordova, Mexico. In good condition.

atriceps (Campoplex), Proc. Ent. Soc. Phil., iv, 42, ♀.
890. Cuba. Tips of antennae off.

atriceps (Cryptus), Proc. Acad. Nat. Sci., 1878, 361, ♀.
1129. Great Salt Lake, Utah. Tips of wings ragged.

atriceps (Ephialtes), Proc. Acad. Nat. Sci., 1873, 394, ♀.
623. Orizaba, Mexico. In good condition.

atriceps (Epimecis), Proc. Ent. Soc. Phil., iv, 34, ♀.
Cuba. In Gundlach Collection.

atriceps (Pimpla), Proc. Acad. Nat. Sci., 1873, 404, ♂.
618. Cordova, Mexico. In good condition.

atriceps (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 148, ♀.
776. Orizaba, Mexico. In good condition.

atrifrons (Ichneumon), Proc. Ent. Soc. Phil., iii, 157, ♀.
927. Illinois. In good condition.

atriventris (Mesochorus), Can. Ent., iv, 21, ♂.
1585. Illinois. Tips of antennae off.

atriventris (Ophion), Proc. Acad. Nat. Sci., 1873, 374, ♀.
71. Orizaba, Mexico. In good condition.

atrocaeruleus (Trogus), Trans. Am. Ent. Soc., ii, 92, ♀.
Louisiana. (Norton Collection.) Type probably lost.

atrocoxalis (Exochus), Trans. Am. Ent. Soc., ii, 114, ♀.
1325. Dakota. Abdomen and posterior legs off, but pasted on card attached to pin.

atrocoxalis (Pimpla), Trans. Am. Ent. Soc., iii, 145, ♀.
1423. Hudson Bay Territory. Antennae off.

atrovittata (Eiphosoma), Proc. Ent. Soc. Phil., iv, 52, fig. ♀.
891. Cuba. In good condition.

atrox (Ichneumon), Trans. Am. Ent. Soc., vi, 151, ♀.
928. Canada. In good condition.
atrox (Trogus), Trans. Am. Ent. Soc., ii, 93, ♀.
1265. Dakota. Tip of antennae off.
audax (Ichneumon), Proc. Ent. Soc. Phil., iii, 143, ♂.
929. Colorado. In good condition.
audax (Mesostenus), Can. Ent., x, 207, ♀.
1172. Georgia. In good condition.
audax (Porizon), Trans. Am. Ent. Soc., iv, 174, ♂.
1595. Texas. In good condition.
aurifer (Campoplex), Proc. Acad. Nat. Sci., 1873, 383, ♀ ♂.
846 ♀. Orizaba, Mexico. In good condition.
australis (Xylonomus), Trans. Am. Ent. Soc., iii, 167, ♀.
1520. Louisiana. In good condition.
austrinus (Trogus), Trans. Am. Ent. Soc., ii, 92, ♂ ♀.
1266 ♀. Florida. In good condition.
azotus (Ichneumon), Proc. Ent. Soc. Phil., iii, 150, ♂.
930. Delaware. In good condition.
azteca (Eiphosoma), Proc. Acad. Nat. Sci., 1873, 381, ♀ ♂.
842 ♀. Orizaba, Mexico. Left posterior tarsus off.
azteca (Lampronota), Proc. Acad. Nat. Sci., 1873, 408, ♀.
637. Orizaba, Mexico. All wings off, except the left posterior.
azteca (Pimpla), Proc. Acad. Nat. Sci., 1873, 401, ♀.
610. Orizaba, Mexico. Tip of right antenna off.
aztecus (Cryptus), Proc. Acad. Nat. Sci., 1873, 133, ♀.
748. Orizaba, Mexico. In good condition.
aztecus (Ichneumon), Trans. Am. Ent. Soc., ii, 20, ♂.
729. Cordova, Mexico. In good condition.
aztecus (Mesoleptus), Proc. Acad. Nat. Sci., 1873, 390, ♂.
866. Orizaba, Mexico. Antennae broken.
aztecus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 152, ♀.
779. Cordova, Mexico. In good condition.
bardus (Mesoleptus), Trans. Am. Ent. Soc., ii, 34, ♂.
2662. Mexico. Right antenna off, except scape.
basalis (Mesochorus), Can. Ent., iv, 22, ♀.
1586. Massachusetts. In good condition.
basalis (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxvii, ♀.
1189. Florida. Right antenna off.
basalis (Trachynotus), Proc. Ent. Soc. Phil., iv, 50, ♂.
Cuba. In Gundlach Collection.
behrensii (Pimpla), Proc. Acad. Nat. Sci., 1878, 377, ♂ ♀.
1424 ♀. California. In good condition.
belangeri (Amblyteles), Trans. Am. Ent. Soc., vi, 190, ♀.
1235. Canada. Tip of right antenna off.

belfragei (Ichneumon), Trans. Am. Ent. Soc., iv, 156, ♂.
Texas. Type in Belfrage Collection, U. S. N. M. No. 18,802. "Right antenna gone."

bella (Lampronota), Proc. Acad. Nat. Sci., 1873, 408.
638. Cordova, Mexico. Antennae and abdomen broken.

bellus (Campoplex?), Proc. Ent. Soc. Phil., iv, 44, ♀?
Cuba. In Gundlach Collection.

bellus (Campoplex), Trans. Am. Ent. Soc., iv, 172, ♂.
1555. Texas. In good condition. Var. *a*, type in Belfrage Collection, No. 1583, U. S. N. M.; "condition good." Probably not congeneric with the Cuban species.

bellus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxviii, ♂.
1190. Nevada. Apical half of left antenna off.

bethunei (Meniscus), Can. Ent., i, 105, ♀.
1505. Credit, Ontario, Canada. Tips of right antenna off.

bicincta (Pimpla), Proc. Ent. Soc. Phil., iv, 38, ♀.
897. Cuba. In good condition.

bicinctus (Hemiteles), Proc. Ent. Soc. Phil., iv, 24, ♀.
Cuba. In Gundlach Collection.

bicolor (Mesoleptus), Proc. Ent. Soc. Phil., iii, 269, ♂.
1343. Pennsylvania. Both hind tarsi off.

bicolor (Odontomerus), Trans. Am. Ent. Soc., iii, 169, ♀.
1526. Pennsylvania. Apical half of right antenna off.

bicoloratus (Mesoleptus), Trans. Am. Ent. Soc., iv, 166, ♂.
Texas. In Belfrage Collection; type No. 1493, U. S. N. M. "Left antenna gone; right antenna broken beyond seventh joint."

bimaculatus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 173, ♂ ♀.
823 ♀. Orizaba, Mexico. In good condition.

bioculatus (Exetastes), Trans. Am. Ent. Soc., iv, 169, ♂.
Texas. In Belfrage Collection; type No. 4018, U. S. N. M. "Apex of left antenna gone."

bioculatus (Ichneumon), Trans. Am. Ent. Soc., vi, 158, ♀ ♂.
931 ♀. White Mountains, New Hampshire. In good condition.

bipunctatus (Ichneumon), Proc. Ent. Soc. Phil., iv, 253, ♂.
932. Colorado. In good condition.

bizonatus (Ichneumon), Proc. Ent. Soc. Phil., iii, 160, ♀.
933. Colorado. In good condition.

blakei (Ichneumon), Proc. Ent. Soc. Phil., iii, 139, ♂.
917. Colorado. In good condition.

blandii (Ischnus), Proc. Ent. Soc. Phil., iii, 188, ♂.
1247. Pennsylvania. In good condition.

blandita (Trogus), Proc. Acad. Nat. Sci., 1873, 132, ♂ ♀.
747 ♀. Orizaba, Mexico. Tip of left antenna off.

bolteri (Trogus), Trans. Am. Ent. Soc., ii, 94, ♂.
Lake Superior, Michigan. Collection of A. Bolter.
borealis (Banchus), Can. Ent., i, 33, ♂.
1626. Ontario, Canada. In good condition.
borealis (Glypta), Trans. Am. Ent. Soc., iii, 158, ♂.
1458. Canada. Left antenna detached.
borealis (Xorides), Trans. Am. Ent. Soc., iii, 167, ♀.
1516. Hudson Bay Territory. Antennae and right posterior leg off.
braconoides (Pimpla), Proc. Acad. Nat. Sci., 1873, 404, ♀.
617. Orizaba, Mexico. Tips of antenna off.
brevipennis (Ichneumon), Proc. Ent. Soc. Phil., iii, 174, ♀.
934. Colorado. In good condition.
breviventris (Ichneumon), Proc. Ent. Soc. Phil., iv, 12, ♂.
Cuba. In Gundlach Collection.
bronteus (Ichneumon), Proc. Ent. Soc. Phil., iii, 144, ♂.
935. Pennsylvania. In good condition.
brullei (Trogus), Trans. Am. Ent. Soc., vi, 196, ♂ ♀.
1267 ♂. Connecticut. In good condition.
brunnea (Lissonota), Can. Ent., i, 37, ♀.
1494. Ottawa, Ontario, Canada. Both antennae off.
brunnipes (Exochus), Proc. Acad. Nat. Sci., 1878, 374, ♀.
1315. Nevada. In good condition.
buccatus (Cryptus), Trans. Am. Ent. Soc., iv, 159, ♀ ♂.
1130 ♀. Texas. In good condition.
buccatus (Trogus), Proc. Acad. Nat. Sci., 1878, 356, ♀.
1268. Vancouver Island, British Columbia. Both antennae broken.
bucephalus (Mesoleptus?), Trans. Am. Ent. Soc., ii, 36, ♂.
865. Cordova, Mexico. Right antenna broken.
burgessi (Tryphon), Trans. Am. Ent. Soc., ii, 105, ♂.
1508. Massachusetts. In good condition.
burgessii (Polysphincta), Trans. Am. Ent. Soc., iii, 149, ♂.
1428. Beverly, Massachusetts. In good condition.
burrus (Euceros), Can. Ent., i, 104, ♀.
1379. Ottawa, Ontario, Canada. Right posterior tarsus off.
burrus (Ichneumon), Proc. Ent. Soc. Phil., iv, 14, ♀.
900. Cuba. In good condition.
burrus (Tryphon), Trans. Am. Ent. Soc., ii, 108, ♀.
1346. Connecticut. In good condition.
caeruleata (Pimpla), Proc. Acad. Nat. Sci., 1873, 397, ♀ ♂.
602 ♀. Orizaba, Mexico. In good condition.
caeruleus (Exetastes), Proc. Ent. Soc. Phil., iv, 276, ♀.
1610. Colorado. In good condition.
caeruleus (Ichneumon), Proc. Ent. Soc. Phil., iii, 149, ♀.
936. Illinois. In good condition.

caeruliventris (Exochus), Trans. Am. Ent. Soc., ii, 38, ♂.
877. Cordova, Mexico. Left antenna off.
calcarata (Christolia), Proc. Acad. Nat. Sci., 1873, 164, ♂.
806. Orizaba, Mexico. In good condition.
calcaratus (Campoplex), Proc. Acad. Nat. Sci., 1873, 384, ♂ ♀.
851 ♀. Orizaba, Mexico. Left anterior wing detached.
calidus (Mesoleptus), Trans. Am. Ent. Soc., ii 33, ♂.
2663. Mexico. Right anterior wing detached.
californica (Grotea), Proc. Acad. Nat. Sci., 1878, 370, ♀.
1534. California. Apical two-thirds of antennae off.
californica (Limneria), Proc. Acad. Nat. Sci., 1878, 369, ♂.
1565. San Diego, California. Both antennae off, abdomen detached and legs more or less broken.
californicum (Anomalon), Proc. Acad. Nat. Sci., 1878, 367, ♀.
1547. California. Anterior wings detached.
californicus (Cteniscus), Proc. Acad. Nat. Sci., 1878, 374, ♂.
1336. California. Right antenna off.
californicus (Ichneumon), Proc. Ent. Soc. Phil., iii, 180, ♂.
937. California. In good condition.
californicus (Nototrachys), Proc. Acad. Nat. Sci., 1878, 366, ♀.
1862. San Diego, California. Both antennae and left hind tibia off.
californicus (Phygadeuon), Proc. Acad. Nat. Sci., 1878, 358, ♂.
1217. California. In good condition.
californicus (Phytodietus), Proc. Acad. Nat. Sci., 1878, 380, ♀.
1512. California. In good condition.
californicus (Platylabus), Proc. Acad. Nat. Sci., 1878, 357, ♀.
1260. San Zalito (error for Sausalito), California. In good condition.
californicus (Tryphon), Proc. Acad. Nat. Sci., 1878, 373, ♂ ♀.
1376 ♀. San Diego, California. Right antenna off.
californicus (Xylonomus), Proc. Acad. Nat. Sci., 1878, 380, ♀.
1523. California. Left antenna off, also right anterior wing and both posterior wings.
caliginosus (Ichneumon), Proc. Ent. Soc. Phil., iii, 144, ♀.
938. Colorado. In good condition.
calitergus (Ichneumon), Trans. Am. Ent. Soc., i, 299, ♀.
939. Maine. In good condition.
canadensis (Arenetra), Can. Ent., i, 36, ♂.
1469. London, Ontario, Canada. In good condition.
canadensis (Banchus), Can. Ent., i, 34, ♂ ♀.
1623 ♂. Ontario, Canada. In good condition.
canadensis (Euceros), Can. Ent., i, 103, ♀.
1348. Grimsby, Ontario, Canada. Abdomen broken at base.
canadensis (Glypta), Trans. Am. Ent. Soc., iii, 157, ♀.
1457. Ontario, Canada. In good condition.

canadensis (Ichneumon), Trans. Am. Ent. Soc., i, 308, ♀.
940. Canada. In good condition.
canadensis (Pezomachus), Can. Ent., iv, 62, ♀.
1204. Ontario, Canada. In good condition.
canadensis (Platylabus), Trans. Am. Ent. Soc., vi, 200, ♀.
1261. Canada. In good condition.
canadensis (Rhyssa), Can. Ent., i, 35, ♀.
1439. Quebec, Canada. Tips of antennae broken.
candidus (Mesostenus), Can. Ent., x, 206, ♂.
1173. New York. In good condition.
capitatus (Tryphon), Proc. Ent. Soc. Phil., iii, 281, ♂.
1387. Pennsylvania. Tips of antennae and left posterior leg, off.
carinatus (Tryphon), Proc. Ent. Soc. Phil., iii, 273, ♂.
1319. Illinois. In good condition.
celaya (Cryptus), Proc. Acad. Nat. Sci., 1873, 135, ♀.
751. Mirador, Mexico. Apical half of left antenna, and left leg except coxa, off.
centralis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 174, ♀.
824. Orizaba, Mexico. Tips of antennae, and left anterior wing, off.
centrosus (Ichneumon), Trans. Am. Ent. Soc., ii, 8, ♂.
708. Cordova, Mexico. In good condition.
cephalotes (Ichneumon), Proc. Acad. Nat. Sci., 1873, 123, ♀.
698. Mirador, Mexico. Apex of right antenna, and venter wanting.
cestus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 353, ♀.
941. Vancouver Island, British Columbia. In good condition.
chalco (Ichneumon), Trans. Am. Ent. Soc., ii, 7, ♂.
690. Cordova, Mexico. In good condition.
chalybeus (Ichneumon), Trans. Am. Ent. Soc., vi, 146, ♀.
942. Massachusetts. In good condition.
chiapus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 112, ♂.
660. Cordova, Mexico. Left antenna off.
chichimeca (Pimpla?), Proc. Acad. Nat. Sci., 1873, 402, ♂.
614. Orizaba, Mexico. In good condition.
chichimecus (Ichneumon), Trans. Am. Ent. Soc., ii, 19, ♂.
699. Cordova, Mexico. In good condition.
chichimecus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 155, ♀.
787. Orizaba, Mexico. In good condition.
cholula (Ichneumon), Trans. Am. Ent. Soc., ii, 5, ♀.
654. Cordova, Mexico. In good condition.
cincticornis (Ichneumon), Proc. Ent. Soc. Phil., iii, 139, ♀.
943. Pennsylvania. In good condition.
cincticornis (Phygadeuon), Proc. Ent. Soc. Phil., iii, 309, ♀.
1218. Illinois. In good condition.

cincticornis (Trachynotus), Proc. Ent. Soc. Phil., iv, 49, ♀ ♂.
1628 ♀. Cuba. In poor condition; the thorax crushed by pin and the wings wanting. The ♂ in the Gundlach Collection.

cincticornis (Xylonomus), Proc. Ent. Soc. Phil., iv, 288, ♀.
1519. Colorado. In good condition.

cinctulus (Bassus), Proc. Acad. Nat. Sci., 1878, 375, ♂ ♀.
1114 ♀. California. Legs more or less broken.

cinctus (Tryphon), Proc. Ent. Soc. Phil., iv, 16, ♂.
Cuba. In Gundlach Collection.

citimus (Ichneumon), Trans. Am. Ent. Soc., vi, 144, ♂.
944. White Mountains, New Hampshire. In good condition.

citrifrons (Ichneumon), Trans. Am. Ent. Soc., i, 307, ♂.
945. Pennsylvania. Extreme tip of abdomen off, tip of right antenna and hind tarsi detached.

citrinus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 114, ♂.
667. Orizaba, Mexico. In good condition.

citus (Cryptus), Proc. Acad. Nat. Sci., 1873, 137, ♀.
755. Orizaba, Mexico. Right posterior leg off beyond coxa.

clarus (Ichneumon), Trans. Am. Ent. Soc., i, 297, ♀.
1283. Massachusetts. Tips of antennae off.

clavatus (Cteniscus), Proc. Ent. Soc. Phil., iii, 284, ♂.
1338. Delaware. Head wanting.

claviventris (Tryphon?) Proc. Ent. Soc. Phil., iv, 17, ♂.
Cuba. In Gundlach Collection.

clypeatus (Cteniscus), Trans. Am. Ent. Soc., ii, 113, ♀.
1328. Great Slave Lake, Hudson Bay Territory. Both antennae and right wings, off.

clypeatus (Stilpnus), Trans. Am. Ent. Soc., ii, 95, ♂.
1231. Illinois. In good condition.

collaris (Mesostenus), Proc. Acad. Nat. Sci., 1873, 162, ♂.
803. Orizaba, Mexico. Tips of antennae off.

coloradensis (Amblyteles), Trans. Am. Ent. Soc., vi, 193, ♀.
1236. Colorado. In good condition.

coloradensis (Glypta), Trans. Am. Ent. Soc., iii, 158, ♂.
1463. Colorado. In good condition.

coloradensis (Lampronota), Trans. Am. Ent. Soc., iii, 165, ♀.
1495. Colorado. In good condition.

comalensis (Cryptus), Trans. Am. Ent. Soc., iv, 159, ♀.
1131. Comal County, Texas. Both antennae broken.

comes (Ichneumon), Proc. Ent. Soc. Phil., iii, 158, ♂.
946. Illinois. In good condition.

communis (Mesostenus), Proc. Acad. Nat. Sci., 1873, 154, ♀ ♂.
786 ♀. Mexico. In good condition.

communis (Tryphon), Trans. Am. Ent. Soc., ii, 103, ♂ ♀.
1375 ♂. Pennsylvania. In good condition.
compactus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 153, ♀.
781. Orizaba, Mexico. In good condition.
compactus (Pezomachus), Can. Ent., iv, 63, ♀.
1205. Illinois. In good condition.
compar (Ichneumon), Proc. Acad. Nat. Sci., 1878, 351, ♀.
947. Vancouver Island, British Columbia. In good condition.
compressiventris (Tryphon), Trans. Am. Ent. Soc., ii, 105, ♀ ♂.
1366 ♀. Massachusetts. Right antenna off.
compressus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 260, ♂.
1560. Pennsylvania. Head wanting.
compressus (Stilpnus?), Proc. Ent. Soc. Phil., iv, 260, ♂.
1232. Colorado. In good condition.
comptus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxviii, ♀.
1191. Colorado. In good condition.
comstockii (Ephialtes), Rep. Ent. U. S. Dept. of Agric., 1879, 235, ♀.
New York. In U. S. Nat. Museum; type No. 1527.
concinna (Exochoides), Trans. Am. Ent. Soc., ii, 37, ♂.
876. Cordova, Mexico. Right antenna off.
concinnus (Bassus), Trans. Am. Ent. Soc., ii, 111, ♀.
1115. Connecticut. In good condition.
concinnus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxviii, ♂.
1192. Nevada. In good condition.
concolor (Mesoleptus), Proc. Ent. Soc. Phil., iii, 270, ♀.
1386. New Jersey. Right antenna and tips of left off.
concolor (Ophion), Proc. Ent. Soc. Phil., iv, 56.
76. Cuba. In good condition.
confirmatus (Ichneumon), Trans. Am. Ent. Soc., vi, 178, ♀.
948. New York. In good condition.
conjunctus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 262, ♂ ♀.
1575 ♀. Illinois. In good condition.
consignatus (Ichneumon), Trans. Am. Ent. Soc., i, 298, ♂.
949. West Virginia. In good condition.
consimilis (Exetastes), Proc. Ent. Soc. Phil., iv, 278, ♂.
1615. Colorado. In good condition.
consimilis (Ichneumon), Proc. Ent. Soc. Phil., iii, 163, ♂.
1301. Colorado. In good condition. Name preoccupied, and changed to *nubivagus*.
consimilis (Punpla), Proc. Ent. Soc. Phil., iv, 37, ♀.
621. Cuba. In good condition.
consors (Cteniscus), Trans. Am. Ent. Soc., ii, 113, ♀.
1329. Connecticut. Antennae and left hind leg off.

consors (Platylabus), Proc. Acad. Nat. Sci., 1878, 356, ♂.
1262. California. In good condition.
conspicuus (Hemiteles), Trans. Am. Ent. Soc., iv, 161, ♀.
Texas. In Belfrage Collection; type No. 1579, U. S. N. M. "Right antenna wanting beyond middle."
contiguus (Ischnus), Proc. Ent. Soc. Phil., iii, 190, ♂.
1634. Maryland. Left hind tarsus off.
copei (Trogus), Trans. Am. Ent. Soc., ii, 94, ♂.
1269. West Virginia. In good condition.
copiosus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 146, ♀ ♂.
771 ♀. Orizaba, Mexico. Extreme tips of antennae off.
cordatus (Ichneumon), Proc. Ent. Soc. Phil., iii, 146, ♂.
950. Colorado. In good condition.
corrupta (Limneria), Trans. Am. Ent. Soc., iv, 172, ♀.
Texas. Belfrage Collection. "Not found."
corvinus (Ichneumon), Trans. Am. Ent. Soc., vi, 145, ♀.
951. White Mountains, New Hampshire. In good condition.
costale (Ophion), Proc. Acad. Nat. Sci., 1878, 366, ♀.
68. Klamath County, California. Right antenna broken, and right upper wing off.
couperii (Euceros), Can. Ent., i, 104, ♂.
1349. Ottawa, Ontario, Canada. Tip of right antenna off.
crassicauda (Pimpla), Proc. Acad. Nat. Sci., 1873, 399, ♀.
606. Orizaba, Mexico. In good condition.
crassicornis (Cryptus), Proc. Ent. Soc. Phil., iii, 292, ♂.
1132. Colorado. In good condition.
crassitarsus (Meniscus), Proc. Acad. Nat. Sci., 1873, 409, ♀.
642. Orizaba, Mexico. In good condition.
crassus (Tryphon), Trans. Am. Ent. Soc., ii, 107, ♀ ♂.
1357 ♀. New Jersey. In good condition.
creperus (Ichneumon), Trans. Am. Ent. Soc., i, 298, ♂.
952. Canada. In good condition.
croceipes (Pimpla), Proc. Acad. Nat. Sci., 1873, 398, ♂ ♀.
603. Orizaba, Mexico. In good condition.
croceiventris (Tryphon), Trans. Am. Ent. Soc., ii, 36, ♂.
872. Cordova, Mexico. In good condition.
crotchii (Cryptus), Proc. Acad. Nat. Sci., 1878, 362, ♀ ♂.
1133 ♀. San Diego, California. Left wings off.
crotchii (Phygadeuon), Proc. Acad. Nat. Sci., 1878, 357, ♀.
1219. Lake Lahache, British Columbia. Both upper wings off.
crudosus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 351, ♂.
953. California. In good condition.
cubensis (Cryptus), Proc. Ent. Soc. Phil., iv, 21, ♀ ♂.
883 ♀. Cuba. Tips of antennae off.

cubensis (Ichneumon), Proc. Ent. Soc. Phil., iv, 13, ♀.
Cuba. In Gundlach Collection.

cubensis (Pimpla), Proc. Ent. Soc. Phil., iv, 35, ♀.
620. Cuba. Tip of right antenna off.

cultus (Mesoleptus), Trans. Am. Ent. Soc., ii, 99, ♂.
1389. New Jersey. Both antennae off.

cupidus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 115, ♀ ♂.
670 ♂. Orizaba, Mexico. Tip of right antenna, and of right posterior tarsus, off.

cupitus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 350, ♂.
954. California. In good condition.

curiatus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 112, ♀ ♂.
661 ♀. Orizaba, Mexico. Tip of left antenna off.

dakota (Glypta), Trans. Am. Ent. Soc., iii, 158, ♀ ♂.
1460 ♀. Dakota. Right antenna broken.

dakota (Ichneumon), Trans. Am. Ent. Soc., i, 302, ♂.
955. Dakota. Left hind tibia off.

decens (Mesoleptus), Trans. Am. Ent. Soc., ii, 101, ♂.
1393. West Virginia. In good condition.

decolorata (Glypta), Proc. Acad. Nat. Sci., 1873, 406, ♂.
634. Orizaba, Mexico. In good condition.

decoloratus (Exetastes), Proc. Ent. Soc. Phil., iv, 280, ♂.
1616. Colorado. In good condition.

decoloratus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 265, ♂.
1385. Illinois. Both antennae off.

decoloratus (Phaeogenes), Trans. Am. Ent. Soc., vi, 203, ♀.
1258. White Mountains, New Hampshire. Right antenna off.

decorata (Joppa), Trans. Am. Ent. Soc., ii, 32, ♂.
741. Cordova, Mexico. Tips of antennae off.

decoratus (Bassus), Proc. Acad. Nat. Sci., 1878, 375, ♂.
1116. California. In good condition.

decorosus (Ichneumon), Trans. Am. Ent. Soc., ii, 8, ♂.
707. Cordova, Mexico. Both antennae off, and legs more or less broken.

decorosus (Mesoleptus), Trans. Am. Ent. Soc., ii, 35, ♂.
864. Cordova, Mexico. Tips of antennae and left wings off.

dejectus (Mesostenus), Trans. Am. Ent. Soc., iv, 163, ♀.
1174. Comal County, Texas. Left antenna broken.

delecta (Cryptanura), Proc. Acad. Nat. Sci., 1873, 167, ♀.
812. Orizaba, Mexico. In good condition.

delicatus (Ichneumon), Proc. Ent. Soc. Phil., iv, 253, ♂.
956. Colorado. In good condition.

delicatus (Mesoleptus), Trans. Am. Ent. Soc., iv, 166, ♂.
Texas. The type in the Society's collection not found. A specimen in the Belfrage Collection marked "Type No. 1601," U. S. N. M. in good condition.

delicatus (Porizon?), Trans. Am. Ent. Soc., iv, 176, ♂.
Texas. In Belfrage Collection; type No. 1593, U. S. N. M. "Condition good."

dictiosus (Ichneumon), Trans. Am. Ent. Soc., vi, 164, ♂.
957. Kansas. In good condition.

difficilis (Ichneumon), Proc. Acad. Nat. Sci., 1878, 351, ♂.
958. California. Tip of right antenna and left upper wing, off; tips of anterior wings broken.

diligens (Mesostenus), Can. Ent., x, 207, ♀.
1175. Illinois. In good condition.

dilucidus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 112, ♂ ♀.
662 ♀. Orizaba, Mexico. In good condition.

dimidiatus (Mesoleptus?), Proc. Ent. Soc. Phil., iii, 265, ♀.
1576. Illinois. Both antennae broken.

dimidiatus (Pezomachus), Can. Ent., iv, 63, ♀.
1206. Massachusetts. In good condition.

dimidiatus (Tryphon), Trans. Am. Ent. Soc . ii, 108, ♂.
1358. New Jersey. In good condition.

dirus (Cryptus), Proc. Acad. Nat. Sci., 1878, 359, ♀.
1134. California. In good condition.

discoidalis (Mesostenus), Trans. Am. Ent. Soc., iv, 162, ♀.
Texas. In Belfrage Collection; type No. 1575, U. S. N. M. "Condition good."

discolor (Mesoleptus), Proc. Ent. Soc. Phil., iii, 271, ♂.
1384. Delaware. In good condition.

discus (Ichneumon), Proc. Ent. Soc. Phil., iii, 168, ♂.
959. Colorado. In good condition.

discus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 153, ♀.
782. Orizaba, Mexico. In good condition.

discus (Phaeogenes), Trans. Am. Ent. Soc., vi, 203, ♂.
1259. White Mountains, New Hampshire. In good condition.

disparilis (Ichneumon), Trans. Am. Ent. Soc., i, 307, ♀.
960. Connecticut. Left hind leg off.

dissonus (Hoplismenus), Trans. Am. Ent. Soc., ii, 23, ♀.
718. Cordova, Mexico. In good condition.

distinctus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 266, ♀.
1567. New Jersey. Tips of antennae off, and abdomen detached.

distinctus (Phytodietus), Trans. Am. Ent. Soc., iii, 166, ♀.
1507. Delaware. In good condition.

divisus (Campoplex), Proc. Acad. Nat. Sci., 1873, 385, ♂.
853. Orizaba, Mexico. Tip of left antenna off.

donabilis (Joppidium), Proc. Acad. Nat. Sci., 1873, 139, ♂ ♀.
759 ♀. Cordova, Mexico. Extreme tip of left antenna off.

dorsalis (Cteniscus), Proc. Ent. Soc. Phil., iii, 282, ♂.
1333. Illinois. In good condition.

dorsalis (Exochus), Proc. Ent. Soc. Phil., iii, 286, ♂.
1321. New Jersey. Tip of right antenna off.
dorsalis (Ichneumon), Proc. Ent. Soc. Phil., iii, 177, ♀.
1470. Colorado. In good condition.
dubiosum (Joppidium), Proc. Acad. Nat. Sci., 1873, 138, ♀ ♂.
757 ♀. Cordova, Mexico. Extreme tips of antennae off.
dubitatus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 259, ♀.
1568. Illinois. In good condition.
durus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 125, ♂.
705. Cordova, Mexico. In good condition.
ectypus (Polyaenus), Proc. Acad. Nat. Sci., 1873, 149, ♀.
777. Orizaba, Mexico. In good condition.
edwardsii (Anomalon), Proc. Acad. Nat. Sci., 1878, 367, ♀.
1544. Vancouver Island, British Columbia. Right upper wing off.
edwardsii (Cryptus), Proc. Acad. Nat. Sci., 1878, 363, ♀.
1135. California. In good condition.
edwardsii (Lampronota), Proc. Acad. Nat. Sci., 1878, 379, ♀.
1496. Vancouver Island, British Columbia. In good condition.
edwardsii (Linoceras), Proc. Acad. Nat. Sci., 1878, 365, ♂.
1256. California. In good condition.
edwardsii (Metopius), Proc. Acad. Nat. Sci., 1878, 376, ♂.
1193. Washington Territory. Antennae broken.
edwardsii (Trogus), Proc. Acad. Nat. Sci., 1878, 356, ♂.
1270. Vancouver Island, British Columbia. In good condition.
egregia (Joppa?), Trans. Am. Ent. Soc., ii, 30, ♀.
738. Cordova, Mexico. In good condition.
electilis (Mesochorus), Trans. Am. Ent. Soc., iv, 171, ♀.
1587. Texas. In good condition.
electus (Ichneumon), Trans. Am. Ent. Soc., i, 304, ♂.
1284. Connecticut. In good condition.
elegans (Anomalon?), Proc. Acad. Nat. Sci., 1873, 379, ♀.
840. Orizaba, Mexico. In good condition.
elegans (Meniscus), Trans. Am. Ent. Soc., iii, 165, ♀ ♂.
1503 ♀. West Virginia. In good condition.
elegans (Thyreodon), Proc. Ent. Soc. Phil., iv, 47, ♀.
Cuba. In Gundlach Collection.
elegans (Trogus), Trans. Am. Ent. Soc., ii, 94, ♀.
1271. Maine. Tips of antennae, of abdomen and venter off.
elegantula (Joppa), Trans. Am. Ent. Soc., ii, 32, ♂.
742. Cordova, Mexico. In good condition.
elongatus (Mesoleptus), Trans. Am. Ent. Soc., ii, 96, ♀ ♂.
1397 ♂. Massachusetts. In good condition.
emaceratus (Mesoleptus), Trans. Am. Ent. Soc., ii, 35, ♂.
863. Cordova, Mexico. In good condition.

encaustus (Ichneumon), Trans. Am. Ent. Soc., ii, 4, ♀.
651. Cordova, Mexico. In good condition.
epicus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 121, ♂.
695. Mirador, Mexico. Apical half of left antenna off.
erratica (Glypta), Trans. Am. Ent. Soc., iii, 152, ♀ ♂.
1445 ♀. West Virginia. In good condition.
esurialis (Hoplismenus), Trans. Am. Ent. Soc., ii, 25, ♂ ♀.
725 ♂. Cordova, Mexico. In good condition.
evectus (Exochus), Trans. Am. Ent. Soc., iv, 168, ♀ (should be ♂).
Texas. In Belfrage Collection; type No. 1606, U. S. N. M. "Condition good."
exaptus (Mesostenus), Can. Ent., x, 208, ♀.
1176. Massachusetts. In good condition.
excelsus (Cryptus), Proc. Ent. Soc. Phil., iii, 293, ♀ ♂.
1136 ♀. Colorado. In good condition.
excelsus (Cteniscus), Proc. Ent. Soc. Phil., iv, 262, ♀.
1337. Colorado. Tips of antennae off.
excultus (Ichneumon), Trans. Am. Ent. Soc., i, 293, ♀.
1285. New Jersey. In good condition.
excuratus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 119, ♂.
688. Cordova, Mexico. Left anterior wing off.
exigua (Lampronota), Trans. Am. Ent. Soc., iii, 164, ♀.
1490. West Virginia. Right antenna and apex of left antenna off.
exiguus (Ichneumon), Proc. Ent. Soc. Phil., iii, 182, ♀.
1286. Colorado. Left anterior wing off.
exiguus (Tryphon?), Proc. Ent. Soc. Phil., iv, 16, ♀.
Cuba. In Gundlach Collection.
exilis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 171, ♂.
817. Orizaba, Mexico. In good condition.
exilis (Lampronota), Trans. Am. Ent. Soc., iii, 165, ♀ ♂.
1492 ♀. Canada. Left antenna off.
eximius (Mesoleptus), Trans. Am. Ent. Soc., ii, 100, ♂.
1637. Connecticut. Left antenna off.
expertus (Campoplex), Trans. Am. Ent. Soc., iv, 171, ♂.
1557. Texas. In good condition.
expunctus (Ichneumon), Trans. Am. Ent. Soc., i, 290, ♂.
See *obliteratus* ||Cress.
exquisitus (Ichneumon), Trans. Am. Ent. Soc., ii, 12, ♂ ♀.
722 ♀. Cordova, Mexico. In good condition.
extrematis (Cryptus), Proc. Ent. Soc. Phil., iii, 304, ♀ ♂.
1137 ♀. Pennsylvania. Both antennae broken.
extrematis (Ichneumon), Proc. Ent. Soc. Phil., iii, 149, ♀.
961. Illinois. In good condition.
exulans (Cryptus), Trans. Am. Ent. Soc., iv, 157, ♂.
1138. Comal County, Texas. In good condition.

facetus (Ichneumon), Trans. Am. Ent. Soc., i, 311, ♂.
962. West Virginia. In good condition.
facetus (Mesoleptus), Trans. Am. Ent. Soc., ii, 100, ♂.
1402. West Virginia. In good condition.
facilis (Mesostenus), Proc. Acad. Nat. Sci., 1873, 153, ♀.
783. Orizaba, Mexico. In good condition.
facilis (Porizon), Trans. Am. Ent. Soc., iv, 175, ♀ ♂.
1597 ♀. Texas. In good condition.
famelicus (Ichneumon), Trans. Am. Ent. Soc., ii, 14, ♂.
678. Cordova, Mexico. Tips of antennae off beyond annulus.
fasciata (Ceratosoma), Proc. Ent. Soc. Phil., iv, 283 (Note).
1622 ♀. Delaware. In good condition.
fascipennis (Epimecis), Proc. Ent. Soc. Phil., iv, 33, ♀.
626. Cuba. Both antennae broken, right posterior wing off. Type specimen returned by Gundlach.
fascipennis (Exetastes), Proc. Ent. Soc. Phil., iv, 278, ♀.
1617. Colorado. In good condition.
fascipennis (Trogus), Trans. Am. Ent. Soc., vi, 195, ♀.
1272. Texas. In good condition.
femoratus (Metopius), Proc. Acad. Nat. Sci., 1873, 393, ♂.
880. Cordova, Mexico. Right antenna off.
feralis (Ichneumon), Trans. Am. Ent. Soc., i, 301, ♀.
963. Massachusetts. In good condition.
feralis (Pimpla), Proc. Acad. Nat. Sci., 1873, 399, ♂.
605. Orizaba, Mexico. In good condition.
ferox (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 143, ♀.
763. Orizaba, Mexico. In good condition.
ferrugineus (Ophiopterus), Proc. Acad. Nat. Sci., 1873, 380, ♀.
80. Orizaba, Mexico. In good condition.
ferruginosa (Epimecis), Proc. Ent. Soc. Phil., iv, 32, ♀.
625. Cuba. In good condition.
festivus (Tryphon), Proc. Ent. Soc. Phil., iii, 279, ♂.
1372. Illinois. Both antennae off.
festus (Ichneumon), Proc. Ent. Soc. Phil., iv., 257, ♂.
964. Colorado. In good condition.
finitimus (Ichneumon), Trans. Am. Ent. Soc., i, 304, ♂.
965. Illinois. Left posterior wing and tip of right hind tarsus off.
flavescens (Banchus), Can. Ent., i, 33, ♂.
1627. Ottawa, Ontario, Canada. In good condition.
flavescens (Euceros), Can. Ent., i, 105, ♂ ♀.
1353 ♂. Connecticut. In good condition.
flavescens (Mesostenus), Proc. Ent. Soc. Phil., iv, 31, ♀.
Cuba. In Gundlach Collection.

flavicornis (Ichneumon), Proc. Ent. Soc. Phil., iii, 140, ♂.
966. New York. Right hind tarsus off.
flavicoxae (Ctenistes), Proc. Ent. Soc. Phil., iii, 283, ♀.
1330. Delaware. In good condition.
flavifrons (Mesoleptus), Proc. Ent. Soc. Phil., iii, 269, ♂.
1404. New Jersey. In good condition.
flavipennis (Campoplex), Proc. Acad. Nat. Sci., 1873, 383, ♀.
847. Orizaba, Mexico. In good condition.
flavipennis (Exetastes), Proc. Ent. Soc. Phil., iv, 275, ♀.
1608. Colorado. In good condition.
flavipennis (Trogus), Proc. Ent. Soc. Phil., iii, 287.
1273. Colorado. In good condition.
flavirictus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 263, ♀.
1579. Pennsylvania. Both antennae off, and abdomen detached.
flavitarsis (Exetastes), Proc. Ent. Soc. Phil., iv, 277, ♂.
1618. Colorado. In good condition.
flavitarsis (Trogus), Proc. Ent. Soc. Phil., iv, 264, ♂.
1274. Colorado. In good condition.
flavizonatus (Ichneumon), Proc. Ent. Soc. Phil., iii, 156.
967 ♂. Virginia. In good condition.
flavovarius (Ichneumon), Proc. Ent. Soc. Phil., iv, 14, ♂.
899. Cuba. In good condition.
flebilis (Ichneumon), Trans. Am. Ent. Soc., vi, 181, ♀.
968. Canada. In good condition.
formosus (Arotes), Can. Ent., i, 34, ♂.
1435. Ottawa, Ontario, Canada. Right antenna off.
fortis (Mesostenus), Can. Ent. x, 206, ♀.
1177. New York. Both antennae detached.
frater (Cryptus), Proc. Ent. Soc. Phil., iii, 303, ♀.
1139. Illinois. In good condition.
fraternus (Amblyteles), Trans. Am. Ent. Soc., vi, 192, ♂.
1237. Massachusetts. In good condition.
frigida (Lissonota), Can. Ent., i, 36, ♀.
1487. Ontario, Canada. Right antenna broken, and left middle and hind legs off.
frigida (Schizopyga), Trans. Am. Ent. Soc., iii, 159, ♀.
1468. Hudson Bay Territory. Both antennae broken.
frigidus (Bassus), Trans. Am Ent. Soc., ii, 111, ♀.
1117. Great Slave Lake, Hudson Bay Territory. Both antennae off, also right posterior tarsus.
frigidus (Euceros), Can. Ent., i, 105, ♀.
1350. Maine. In good condition.
frigidus (Xylonomus), Trans. Am. Ent. Soc., iii, 168, ♀.
1522. Hudson Bay Territory. Both antennae off.

frivolus (Ichneumon), Trans. Am. Ent. Soc., ii, 11, ♂.
665. Cordova, Mexico. In good condition.
frontalis (Bassus), Trans. Am. Ent. Soc., ii, 111, ♀.
1113. Illinois. In good condition.
frontalis (Tryphon), Trans. Am. Ent. Soc., ii, 109, ♀.
1361. Connecticut. In good condition.
fucatus (Mesoleptus), Trans. Am. Ent. Soc., ii, 99, ♀.
1390. West Virginia. In good condition.
fulvescens (Cremastus), Proc. Ent. Soc. Phil., iv, 285, ♀ ♂.
1550 ♀. Colorado. In good condition.
fulvescens (Phygadeuon), Proc. Acad. Nat. Sci., 1878, 359, ♀.
1220. California. In good condition.
fulvescens (Pimpla), Proc. Ent. Soc. Phil., iv, 268, ♂.
1541. Colorado. In good condition.
fulvescens (Porizon), Proc. Ent. Soc. Phil., iv, 48, ♀.
Cuba. In Gundlach Collection.
fulvescens (Thyreodon), Proc. Ent. Soc. Phil., iv, 46, ♂.
69. Cuba. In good condition.
fulvipes (Exochus), Proc. Ent. Soc. Phil., iii, 285, ♂ ♀.
1327 ♀. Pennsylvania. Right antenna off.
fulvipes (Trogus), Trans. Am. Ent. Soc., ii, 93, ♂.
1275. Maine. Right antenna off.
fulvus (Mesostenus?), Proc. Ent. Soc. Phil., iii, 316, ♂.
1178. Illinois. In good condition.
fumipenne (Anomalon), Proc. Acad. Nat. Sci., 1873, 379, ♀.
838. Orizaba, Mexico. Both antennae off, and the two anterior pairs of legs more or less broken.
fumipennis (Joppa), Trans. Am. Ent. Soc., ii, 32, ♂ ♀.
743 ♂. Cordova, Mexico. Tip of left antenna off.
funestus (Ichneumon), Proc. Ent. Soc. Phil., iii, 166, ♀.
969. Pennsylvania. In good condition.
fungor (Ichneumon), Trans. Am. Ent. Soc., i, 306, ♂.
1288. New York. In good condition.
fura (Limneria), Trans. Am. Ent. Soc., iv, 173, ♀.
Texas. In Belfrage Collection; type No. 1586, U. S. N. M. "Antennae gone beyond 3rd joint; abdomen loose, but attached."
furvus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 147, ♂.
773. Orizaba, Mexico. In good condition.
fuscatus (Trachynotus), Proc. Ent. Soc. Phil., iv, 50, ♀ ♂.
1629 ♀. Cuba. Tips of both antennae off.
fuscifrons (Ichneumon), Proc. Ent. Soc. Phil., iii, 166, ♀.
970. Illinois. In good condition.
fuscipennis (Epimecis), Proc. Ent. Soc. Phil., iv, 33, ♂.
Cuba. In Gundlach Collection.

fuscipennis (Porizon), Proc. Ent. Soc. Phil., iv, 287, ♀.
1598. Colorado. In good condition.
galenus (Ichneumon), Trans. Am. Ent. Soc., i, 292, ♂.
971. West Virginia. In good condition.
gelida (Lampronota), Proc. Acad. Nat. Sci., 1878, 377, ♂.
1501. Lake Lahache, British Columbia. In good condition.
gentilis (Pezomachus), Can. Ent., iv, 61, ♂ ♀.
1207 ♀. Pennsylvania. In good condition.
germanus (Ichneumon), Trans. Am. Ent. Soc., vi, 143, ♀.
972. Massachusetts. Both hind tarsi broken.
gestuosus (Ichneumon), Trans. Am. Ent. Soc., vi, 156, ♀.
973. White Mountains, New Hampshire. In good condition.
gloriosa (Labena), Proc. Acad. Nat. Sci., 1873, 412, ♀.
647. Mirador, Mexico. In good condition.
gnarus (Campoplex), Proc. Acad. Nat. Sci., 1873, 384, ♂.
850. Orizaba, Mexico. Most of venter eaten away.
gracilentus (Ichneumon), Trans. Am. Ent. Soc., ii, 16, ♀.
681. Cordova, Mexico. Tip of left antenna off.
gracilicornis (Oedicephalus), Trans. Am. Ent. Soc., ii, 28, ♀ ♂.
736 ♀. Cordova, Mexico. In good condition.
gracilicornis (Phytodietus), Proc. Acad. Nat. Sci., 1873, 411, ♂ ♀.
645 ♀. Orizaba, Mexico. In good condition.
gracilipes (Mesostenus), Proc. Acad. Nat. Sci., 1878, 365, ♀.
1179. California. In good condition.
gracilis (Mesostenus), Proc. Ent. Soc. Phil., iii, 315, ♂.
1180. Virginia. Tips of both antennae off.
gracilis (Pezomachus), Can. Ent., iv, 63, ♀.
1208. Pennsylvania. In good condition.
grandis (Thyreodon), Proc. Ent. Soc. Phil., iv, 45, ♀ ♂.
72 ♀. Cuba. In good condition.
grapholithae (Pimpla), Ent. News., i, 50, ♀ ♂.
1418 ♂. Pennsylvania. In good condition.
grotei (Ichneumon), Proc. Ent. Soc. Phil., iii, 154, ♂.
974. Colorado. In good condition.
hageni (Metopius), Trans. Am. Ent. Soc., iv, 168, ♀.
Texas. In Collection Mus. Comp. Zoology; type No. 585. In good condition.
hariolus (Ichneumon), Trans. Am. Ent. Soc., i, 305, ♀.
1289. Massachusetts. In good condition.
hebe (Ichneumon), Trans. Am. Ent. Soc., i, 306, ♀ ♂.
1290 ♀. Illinois. In good condition.
hebrus (Ichneumon), Trans. Am. Ent. Soc., i, 305, ♀ ♂.
1291 ♀. Illinois. In good condition.
heiligbrodtii (Ichneumon), Trans. Am. Ent. Soc., vi, 168, ♂.
975. Bastrop, Texas. In good condition.

helvipes (Ichneumon,) Trans. Am. Ent. Soc., i, 297, ♂ ♀.
976 ♀. Illinois. In good condition.
helvolus (Ichneumon), Trans. Am. Ent. Soc., i, 312, ♀.
1292. Illinois. In good condition.
helvus (Ichneumon), Trans. Am. Ent. Soc., i, 312, ♀.
1293. Pennsylvania. In good condition.
hiemalus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 352, ♀.
977. Aleutian Islands, Alaska. In good condition.
hilaris (Lampronota), Proc. Acad. Nat. Sci., 1878, 378, ♀.
1498. Wilmington, California. Tips of antennae off.
histricus (Ichneumon), Trans. Am. Ent. Soc., i, 294, ♂.
978. West Virginia. In good condition.
hiulcus (Amblyteles), Proc. Acad. Nat. Sci., 1878, 355, ♀.
1238. Lake Lahache, British Columbia. In good condition.
honestus (Ichneumon), Trans. Am. Ent. Soc., i, 310, ♂.
979. West Virginia. Extreme tips of antennae off.
honestus (Mesoleptus), Trans. Am. Ent. Soc., ii, 98, ♂ ♀.
1399 ♀. New Jersey. In good condition.
hospitus (Ichneumon), Trans. Am. Ent. Soc., i, 306, ♀ ♂.
980 ♀. Canada. In good condition.
hostilis (Mesoleptus), Proc. Ent. Soc. Phil., iii, 267, ♂.
1574. Illinois. In good condition.
hudsonicus (Amblyteles), Trans. Am. Ent. Soc., vi, 192, ♀.
1239. Hudson Bay Territory. Both antennae off.
hudsonicus (Stilpnus), Trans. Am. Ent. Soc., ii, 95, ♂.
1233. Hudson Bay Territory. In good condition.
hyalinipennis (Porizon), Trans. Am. Ent. Soc., iv, 174, ♀ ♂.
1599 ♀. Texas. In good condition.
ichneumoniformis (Pimpla), Proc. Acad. Nat. Sci., 1873, 403, ♂.
615. Orizaba, Mexico. In good condition.
ignarus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 121, ♂.
693. Cordova, Mexico. Tips of antennae and of right hind tarsus off.
ignotus (Mesoleptus?), Trans. Am. Ent. Soc., ii, 103, ♀.
2668. West Virginia. Left antenna off.
illaetabilis (Amblyteles), Trans. Am. Ent. Soc., vi, 190, ♂.
1240. Georgia. In good condition.
illepida (Limneria), Trans. Am. Ent. Soc., iv, 172, ♂.
Texas. Belfrage Collection. "Not found."
imbecillus (Mesoleptus), Trans. Am. Ent. Soc., ii, 34, ♂.
862. Cordova, Mexico. Both antennae off.
improvisus (Ichneumon), Trans. Am. Ent. Soc., i, 296, ♂.
1294. New Jersey. Tip of left antenna off.
inaequalipes (Campoplex), Proc. Acad. Nat. Sci., 1873, 386, ♀.
857. Orizaba, Mexico. In good condition.

inceptus (Mesoleptus), Trans. Am. Ent. Soc., ii, 96, ♂ ♀.
1396 ♂. Massachusetts. In good condition.
incerta (Joppa), Proc. Acad. Nat. Sci., 1873, 131, ♀.
744. Orizaba, Mexico. Tip of right antenna off.
incertus (Cryptus), Proc. Ent. Soc. Phil., iii, 306, ♀.
1140. Delaware. In good condition.
incertus (Hemiteles), Proc. Ent. Soc. Phil., iv, 22, ♀ ♂.
884 ♀. Cuba. In good condition.
incertus (Ichneumon), Proc. Ent. Soc. Phil., iii, 180, ♀.
981. New Jersey. In good condition.
incertus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 161, ♀ ♂.
800 ♀. Orizaba, Mexico. Right posterior tarsus off.
inclyta (Joppa), Trans. Am. Ent. Soc., ii, 29, ♀.
745. Cordova, Mexico. In good condition.
incompleta (Pimpla), Trans. Am. Ent. Soc., iii, 147, ♀.
1425. Illinois. In good condition.
inconstans (Ichneumon), Proc. Ent. Soc. Phil., iii, 153, ♂.
982. Colorado. In good condition.
indagatrix (Pimpla), Trans. Am. Ent. Soc., iii, 146, ♂.
1639. Illinois. In good condition.
indemnis (Ichneumon), Proc. Acad. Nat. Sci., 1878, 349, ♀.
983. British Columbia. Right antenna off.
infesta (Limneria), Trans. Am. Ent. Soc., iv, 172, ♀.
Texas. In Belfrage Collection; type No. 1587, U. S. N. M. "Condition good."
infidelis (Ichneumon), Trans. Am. Ent. Soc., i, 296; vi, 155, ♂.
Connecticut. Type in the Norton Collection; probably lost.
infucatus (Ichneumon), Proc. Ent. Soc. Phil., iv, 252, ♂.
984. Colorado. In good condition.
infulatus (Ichneumon), Trans. Am. Ent. Soc., ii, 12, ♀.
732. Cordova, Mexico. Tip of left antenna off.
ingenuus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 172, ♀.
820. Orizaba, Mexico. Left posterior leg off, except coxa.
innoxius (Mesoleptus,) Proc. Acad. Nat. Sci., 1878, 371, ♂.
1395. Lake Quesnel, British Columbia. In good condition.
inoratus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 120, ♂.
691. Mirador, Mexico. Right antenna off.
insidiosus (Mesoleptus), Trans. Am. Ent. Soc., ii, 98, ♂.
1394. Massachusetts. In good condition.
insita (Lampronota), Trans. Am. Ent. Soc., iii, 162, ♀.
1479. New Jersey. In good condition.
insolens (Ichneumon), Trans. Am. Ent. Soc., i, 302, ♂ ♀.
985 ♀. Louisiana. In good condition.
insolens (Limneria?), Proc. Acad. Nat. Sci., 1873, 386, ♂ ♀.
858 ♀. Orizaba, Mexico. Left posterior leg off beyond coxa.

instabilis (Ichneumon), Trans. Am. Ent. Soc., i, 303, ♀ ♂.
986 ♀. New York. In good condition.
insularis (Campoplex), Proc. Ent. Soc. Phil., iv, 42, ♀.
Cuba. In Gundlach Collection.
insularis (Mesoleptus), Proc. Ent. Soc. Phil., iv, 15, ♂ ♀.
882 ♂. Cuba. Right antenna and apex of the left, off.
insularis (Poemeria), Proc. Acad. Nat. Sci., 1878, 380, ♀.
1521. Vancouver Island, British Columbia. Tips of both antennae off, also both right wings and upper left wing.
intentus (Ichneumon), Trans. Am. Ent. Soc., ii, 15, ♂.
680. Cordova, Mexico. In good condition.
intermedius (Phygadeuon), Trans. Am. Ent. Soc., iv, 160, ♀.
1221. Texas. In good condition.
introitus (Mesostenus), Trans. Am. Ent. Soc., iv, 162, ♂.
Texas. In Belfrage Collection; type No. 1577, U. S. N. M. "Right antenna broken off at third joint beyond annulus."
inurbanus (Ichneumon), Trans. Am. Ent. Soc., i, 302, ♀.
987. West Virginia. In good condition.
inversa (Glypta), Trans. Am. Ent. Soc., iii, 153, ♀.
1446. Massachusetts. Left antenna off.
involutus (Ichneumon), Proc. Ent. Soc. Phil., iii, 183, ♀.
988. Colorado. In good condition.
iridescens (Cryptus), Proc. Ent. Soc. Phil., iii, 296, ♂.
1646. Delaware. Both posterior tibiae broken.
iridescens (Ischnus), Proc. Ent. Soc. Phil., iii, 193, ♂.
1141. Delaware. In good condition.
iridescens (Mesochorus), Proc. Acad. Nat. Sci., 1878, 369, ♀.
1588. California. In good condition.
irritatus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 171, ♂.
819. Orizaba, Mexico. Legs much broken.
izucarus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 114, ♀ ♂.
668 ♀. Orizaba, Mexico. In good condition.
jejunus (Ischnus), Proc. Ent. Soc. Phil., iii, 186, ♂.
1248. Illinois. In good condition.
jocosa (Lampronota?), Trans. Am. Ent. Soc., iii, 162, ♂.
1478. Illinois. In good condition.
jucunda (Lampronota?), Proc. Acad. Nat. Sci., 1873, 409, ♀.
640. Orizaba, Mexico. In good condition.
jugiosus (Ichneumon), Trans. Am. Ent. Soc., ii, 9, ♀.
709. Cordova, Mexico. In good condition.
junceus (Cryptus), Proc. Ent. Soc. Phil., iii, 295, ♀.
1142. Illinois. In good condition.
junceus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 116, ♂.
672. Cordova, Mexico. In good condition.

junceus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 145, ♂.
769. Orizaba, Mexico. In good condition.
junctus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 174, ♀.
825. Cordova, Mexico. In good condition.
juxtus (Ichneumon), Proc. Ent. Soc. Phil., iii, 163, ♂.
1295. Colorado. In good condition.
lacivius (Campoplex), Proc. Acad. Nat. Sci., 1873, 383, ♂.
845. Cordova, Mexico. In good condition.
laetus (Mesoleius), Proc. Acad. Nat. Sci., 1878, 372, ♂.
1391. Vancouver Island, British Columbia. In good condition.
laevigata (Lampronota), Trans. Am. Ent. Soc., iii, 162, ♀.
1477. Canada. In good condition.
laevigatus (Ichneumon), Proc. Ent. Soc. Phil., iii, 176, ♀.
1296. Colorado. In good condition.
laevis (Exochus), Proc. Ent. Soc., Phil., iii, 286, ♂ ♀.
1318 ♂. Illinois. In good condition.
lascivus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 170, ♀.
815. Orizaba, Mexico. Right posterior leg off beyond coxa.
lascivus (Ichneumon), Trans. Am. Ent. Soc., i, 309, ♂.
989. Illinois. In good condition.
lassatus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 157, ♂.
792. Orizaba, Mexico. Tips of both antennae, and right posterior leg beyond coxa, off.
lateralis (Clistopyga?), Proc. Ent. Soc. Phil., iv, 34, ♀ ♂.
Cuba. In Gundlach Collection.
laticeps (Cryptus), Trans. Am. Ent. Soc., iv, 157, ♂.
Texas. In Belfrage Collection; type No. 1571, U. S. N. M. "Antennae gone; left has three joints remaining."
laticinctus (Campoplex), Proc. Ent. Soc. Phil., iv, 283, ♀.
1554. Colorado. In good condition.
laticinctus (Mesostenus), Can. Ent., x, 208, ♀.
1181. Louisiana. In good condition.
laticinctus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxix, ♀.
1195. Colorado. In good condition.
laticinctus (Thyreodon), Proc. Acad. Nat. Sci., 1873, 376, ♀.
73. Orizaba, Mexico. Tip of abdomen off and inside eaten away.
laticinctus (Tryphon?), Trans. Am. Ent. Soc., ii, 36, ♀.
873. Cordova, Mexico. Right hind leg off.
latipennis (Trogus), Proc. Acad. Nat. Sci., 1873, 132, ♀.
746. Orizaba, Mexico. In good condition.
lectus (Campoplex), Proc. Acad. Nat. Sci., 1873, 384, ♂.
849. Orizaba, Mexico. In good condition.
lectus (Ichneumon), Trans. Am. Ent. Soc., ii, 18, ♂ ♀.
656 ♀. Cordova, Mexico. In good condition.

legalis (Campoplex), Proc. Acad. Nat. Sci., 1873, 385, ♂.
856. Mirador, Mexico. In good condition.
lenis (Ichneumon), Trans. Am. Ent. Soc., ii, 19, ♀.
731. Cordova, Mexico. In good condition.
leviculus (Ichneumon), Trans. Am. Ent. Soc., vi, 170, ♂.
990. New York. In good condition.
lewisii (Ichneumon), Proc. Ent. Soc. Phil., iii, 177, ♀.
991. Illinois. In good condition.
libens (Ichneumon), Trans. Am. Ent. Soc., vi, 181, ♂.
992. Illinois. Right antenna and left leg, off.
limata (Polysphincta), Trans. Am. Ent. Soc., iii, 150, ♀.
1429. Massachusetts. In good condition.
limatus (Cryptus), Proc. Ent. Soc. Phil., iii, 298, ♀.
1143. Delaware. Middle and hind right legs broken.
limatus (Hoplismenus), Trans. Am. Ent. Soc., ii, 24, ♂.
720. Cordova, Mexico. Tips of antennae off.
limatus (Phygadeuon), Proc. Acad. Nat. Sci., 1878, 358, ♀.
1222. California. In good condition.
limatus (Tryphon?), Proc. Ent. Soc. Phil., iii, 274, ♂.
1388. Delaware. Both antennae broken.
limbifrons (Ichneumon), Proc. Ent. Soc. Phil., iii, 182, ♂.
993. Colorado. Tips of antennae broken.
limitaris (Ichneumon), Trans. Am. Ent. Soc., ii, 9, ♂.
710. Cordova, Mexico. Right wings off.
longicaudis (Mesostenus), Trans. Am. Ent. Soc., iv, 164, ♀.
Texas. In Belfrage Collection; type No. 1578, U. S. N. M. "Antennae broken beyond fourth joint."
longicornis (Mesoleptus), Proc. Ent. Soc. Phil., iii, 270, ♂.
1398. Delaware. In good condition.
longicornis (Oedicephalus), Trans. Am. Ent. Soc., ii, 27, ♀.
734. Cordova, Mexico. In good condition.
longiventris (Glypta), Trans. Am. Ent. Soc., iii, 154, ♂.
1466. Illinois. In good condition.
longula (Glypta), Proc. Acad. Nat. Sci., 1873, 405, ♀.
632. Orizaba, Mexico. In good condition.
longulus (Ichneumon), Proc. Ent. Soc. Phil., iii, 171, ♂.
994. Colorado. In good condition.
luctuosus (Cremastus), Proc. Ent. Soc. Phil., iv, 51, ♂.
Cuba. In Gundlach Collection.
luctuosus (Cryptus), Proc. Ent. Soc. Phil., iii, 290, ♀.
1144. Colorado. In good condition.
luctus (Ichneumon), Proc. Ent. Soc. Phil., iv, 250, ♂.
See *tenebrosus* ||Cress.

lugubris (Lampronota?), Proc. Acad. Nat. Sci., 1878, 379, ♀.
1497. Lake Quesnel, British Columbia. Left upper wing off.
lusorius (Tryphon), Proc. Acad. Nat. Sci., 1878, 373, ♂.
1377. California. Left upper wing off.
luteifrons (Mesoleptus), Trans. Am. Ent. Soc., ii, 99, ♂.
1400. Great Slave Lake, Hudson Bay Territory. Both antennae broken and abdomen detached.
luteipes (Mesochorus), Can. Ent. iv, 22, ♀.
1589. New Jersey. In good condition.
macer (Ephialtes), Can. Ent., i, 35, ♀.
1537. Ontario, Canada. In good condition.
macer (Mesoleptus), Proc. Ent. Soc. Phil., iv, 262, ♀.
1563. Colorado. In good condition.
macer (Pezomachus), Can. Ent., iv, 64, ♂.
1209. Pennsylvania. In good condition.
macer (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 144, ♂ ♀.
766 ♀. Cordova, Mexico. Apical third of right antenna off.
macer (Porizon), Trans. Am. Ent. Soc., iv, 175, ♀ ♂.
1600 ♀. Texas. In good condition.
maceratum (Anomalon), Proc. Acad. Nat. Sci., 1878, 368, ♂.
1548. California. Abdomen off beyond third segment.
maceratus (Campoplex), Proc. Acad. Nat. Sci., 1873, 385, ♂.
854. Cordova, Mexico. Upper portion of apex of abdomen eaten away.
macilentus (Campoplex), Proc. Acad. Nat. Sci., 1873, 384, ♀.
852. Cordova, Mexico. In good condition.
macilentus (Ichneumon), Proc. Ent. Soc. Phil., iv, 249, ♂.
995. Colorado. In good condition.
macilentus (Mesostenus), Can. Ent., x, 210, ♂.
1183. Louisiana. In good condition.
macra (Glypta), Trans. Am. Ent. Soc., iii, 158, ♀.
1453. Canada. Both anterior wings off.
macra (Lampronota), Trans. Am. Ent. Soc., iii, 163, ♂.
1485. Delaware. In good condition.
maculifrons (Bassus), Proc. Ent. Soc. Phil., iv, 272, ♀.
1118. Colorado. In good condition.
maculipennis (Thyreodon), Proc. Acad. Nat. Sci., 1873, 375, ♂ ♀.
70 ♀. Orizaba, Mexico. Both antennae off.
maculipennis (Tryphon?), Proc. Acad. Nat. Sci., 1873, 392, ♂ ♀.
874 ♀. Orizaba, Mexico. Tips of antennae broken.
magniceps (Anomalon), Trans. Am. Ent. Soc., iv, 170, ♀.
1543. Dallas, Texas. In good condition.
magniceps (Ichneumon), Trans. Am. Ent. Soc., i, 299, ♀ ♂.
Cuba. In Gundlach Collection.

magnus (Ichneumon), Proc. Ent. Soc. Phil., iv, 258, ♂.
1298. Colorado. In good condition.
magum (Anomalon), Proc. Acad. Nat. Sci., 1873, 377, ♂ ♀.
834 ♀. Cordova, Mexico. In good condition.
maius (Ichneumon), Trans. Am. Ent. Soc., i, 307, ♀.
996. Massachusetts. In good condition.
major (Campoplex), Proc. Acad. Nat. Sci., 1878, 369, ♀.
1556. Vancouver Island, British Columbia. In good condition.
major (Mesoleptus), Proc. Ent. Soc. Phil., iii, 257, ♂.
2786. Delaware. Only thorax and legs left on pin.
major (Phygadeuon), Proc. Ent. Soc. Phil., iii, 308, ♀.
1223. Illinois. In good condition.
major (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 143, ♀.
764. Orizaba, Mexico. In good condition.
mancus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 145, ♀ ♂.
767 ♀. Orizaba, Mexico. Apical one-third of left antenna off.
mandibularis (Phygadeuon), Proc. Ent. Soc. Phil., iii, 311, ♀.
1224. Illinois. In good condition.
marginipennis (Pimpla), Proc. Acad. Nat. Sci., 1873, 401, ♀.
611. Cordova, Mexico. In good condition.
marginipennis (Trogus), Trans. Am. Ent. Soc., ii, 93, ♂.
1276. Dakota. In good condition.
maritus (Ichneumon), Trans. Am. Ent. Soc., ii, 16, ♂ ♀.
683 ♀. Cordova, Mexico. Right antenna, and upper left wing, off.
maura (Pimpla), Trans. Am. Ent. Soc., iii, 145, ♀.
1413. Texas. In good condition.
maurus (Echthrus?), Proc. Acad. Nat. Sci., 1878, 381, ♀.
1529. Vancouver Island, British Columbia. Tips of antennae off, and legs more or less broken.
maurus (Exetastes), Proc. Acad. Nat. Sci., 1878, 370, ♀.
1609. California. In good condition.
maurus (Ichneumon), Proc. Ent. Soc. Phil., iii, 135, ♀.
997. Virginia. In good condition.
meabilis (Pezomachus), Can. Ent., iv, 62, ♀.
1210. Illinois. Left antenna off.
medialis (Euceros), Can. Ent., i, 105, ♀.
1352. Massachusetts. In good condition.
mediatus (Cteniscus), Proc. Ent. Soc. Phil., iii, 282, ♂.
1332. Illinois. In good condition.
melleum (Anomalon), Trans. Am. Ent. Soc., iv, 171, ♀.
Texas. In Belfrage Collection; type No. 1581, U. S. N. M. "Condition good."
melleus (Mesochorus), Can. Ent., iv, 24, ♂.
1591. Pennsylvania. Right antenna off.

melleus (Mesoleptus), Trans. Am. Ent. Soc., ii, 34, ♂.
861. Cordova, Mexico. Right antenna off.

mellipes (Ichneumon), Trans. Am. Ent. Soc., i, 295, ♂.
1583. Canada. In good condition.

melliventris (Campoplex), Proc. Acad. Nat. Sci., 1873, 383, ♀.
848. Cordova, Mexico. In good condition.

mellosa (Theronia), Proc. Acad. Nat. Sci., 1873, 396, ♂ ♀.
630 ♀. Orizaba, Mexico. In good condition.

mellosus (Trogus), Report Wheeler Explor., 708, ♀ (not ♂).
1277. New Mexico. Tips of wings ragged.

mendax (Ichneumon), Trans. Am. Ent. Soc., vi, 149, ♀.
998. Canada. In good condition.

mendicus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 120, ♀.
692. Orizaba, Mexico. In good condition.

meridionalis (Ichneumon), Proc. Ent. Soc. Phil., iv, 12, ♀.
999. Cuba. In good condition. Occurs also in Mexico.

merus (Ichneumon), Trans. Am. Ent. Soc., vi, 148, ♂.
1038. Virginia. Wings crumpled.

mexicana (Eiphosoma), Proc. Acad. Nat. Sci., 1873, 380, ♀.
841. Cordova, Mexico. In good condition.

mexicana (Epirhyssa), Proc. Acad. Nat. Sci., 1873, 394, ♀.
599. Orizaba, Mexico. Tip of left antenna off.

mexicana (Exochoides), Trans. Am. Ent. Soc., ii, 37, ♂.
875. Cordova, Mexico. In good condition.

mexicana (Grotea), Proc. Acad. Nat. Sci., 1873, 413, ♂ ♀.
648 ♀. Orizaba, Mexico. In good condition.

mexicana (Lampronota), Proc. Acad. Nat. Sci., 1873, 407, ♀ ♂.
636 ♀. Orizaba, Mexico. In good condition.

mexicanum (Anomalon), Proc. Acad. Nat. Sci., 1873, 376, ♀.
832. Orizaba, Mexico. Right antenna off.

mexicanus (Exetastes), Proc. Acad. Nat. Sci., 1873, 389, ♂.
871. Mirador, Mexico. Both posterior tarsi off.

mexicanus (Ichneumon), Trans. Am. Ent. Soc., ii, 2, ♂ ♀.
649 ♀. Cordova, Mexico. In good condition.

mexicanus (Meniscus), Proc. Acad. Nat. Sci., 1873, 410, ♀.
641. Cordova, Mexico. In good condition.

mexicanus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 157, ♀ ♂.
791 ♀. Mexico. In good condition.

mexicanus (Ophion), Proc. Acad. Nat. Sci., 1873, 374, ♀.
78. Cordova, Mexico. In good condition.

mexicanus (Phytodietus), Proc. Acad. Nat. Sci., 1873, 412, ♀.
646. Cordova, Mexico. Right antenna off beyond annulus.

mexicanus (Pristomerus), Proc. Acad. Nat. Sci., 1873, 388, ♂.
868. Mirador, Mexico. In good condition.

mexicanus (Tryphon), Proc. Acad. Nat. Sci., 1873, 391, ♂.
2664. Mirador, Mexico. Tip of abdomen and venter wanting.
militaris (Glypta), Trans. Am. Ent. Soc., iii, 154, ♀.
1451. Illinois. Tip of right anterior wing off.
milvus (Ichneumon), Trans. Am. Ent. Soc., i, 305, ♂.
1039. Massachusetts. In good condition.
mimicus (Ichneumon), Trans. Am. Ent. Soc., i, 300, ♂.
1040. Massachusetts. Tip of left hind tarsus off.
minax (Hoplismenus), Trans. Am. Ent. Soc., ii, 23, ♂.
719. Cordova, Mexico. In good condition.
minimus (Tryphon), Proc. Ent. Soc. Phil., iii, 281, ♀.
1367. Illinois. In good condition.
mirabilis (Christolia), Proc. Acad. Nat. Sci., 1873, 165, ♀ ♂.
808 ♀. Orizaba, Mexico. In good condition.
mirabilis (Meniscus), Trans. Am. Ent. Soc., iii, 166, ♀.
1504. Massachusetts. Tips of antennae off.
mirandus (Christolia), Proc. Acad. Nat. Sci., 1873, 165, ♀.
809. Orizaba, Mexico. In good condition.
mirandus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxix, ♀.
1196. Colorado. In good condition.
modicus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 154, ♀.
785. Cordova, Mexico. In good condition.
monilis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 174, ♀.
827. Orizaba, Mexico. In good condition.
monita (Glypta), Trans. Am. Ent. Soc., iii, 155, ♀.
1452. West Virginia. Tip of right antenna off.
monitus (Ichneumon), Trans. Am. Ent. Soc., ii, 10, ♀.
712. Cordova, Mexico. Tip of left antenna off, also tip of abdomen and venter wanting.
montana (Lampronota), Proc. Ent. Soc. Phil., iv, 267, ♀.
1489. Colorado. In good condition.
montanus (Ichneumon), Proc. Ent. Soc. Phil., iii, 141, ♂ ♀.
1263 ♀. Colorado. In good condition.
montanus (Mesoleptus), Proc. Ent. Soc. Phil., iv, 261, ♀.
1561. Colorado. Right antenna off.
montanus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxviii, ♂.
1197. Colorado. In good condition.
montanus (Phygadeuon), Proc. Ent. Soc. Phil., iii, 309, ♀.
1225. Colorado. In good condition.
montanus (Platylabus), Trans. Am. Ent. Soc., vi, 200, ♀.
1299. White Mountains, New Hampshire. Apical half of right antenna off.
montezuma (Ichneumon), Trans. Am. Ent. Soc., ii, 13, ♂.
721. Cordova, Mexico. Left wings off.

montezuma (Theronia), Proc. Acad. Nat. Sci., 1873, 395, ♂ ♀.
628 ♀. Mexico. In good condition.
montivagus (Ichneumon), Proc. Ent. Soc. Phil., iv, 255, ♂.
1456. Colorado. In good condition.
moratus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 158, ♀ ♂.
793 ♀. Mexico. In good condition.
mormonus (Amblyteles), Proc. Acad. Nat. Sci., 1878, 355, ♀.
1241. Great Salt Lake, Utah. In good condition.
muliebris (Mesoleptus?), Trans. Am. Ent. Soc., ii, 102, ♂.
1408. West Virginia. In good condition.
multor (Ichneumon), Trans. Am. Ent. Soc., i, 299, ♂.
1041. Canada. Extreme tips of antennae off and right upper wing broken.
munificus (Ichneumon), Trans. Am. Ent. Soc., vi, 162, ♂.
See *nobilis* || Cress.
munitus (Hoplismenus), Trans. Am. Ent. Soc., ii, 21, ♂ ♀.
715 ♀. Cordova, Mexico. In good condition.
nanus (Ichneumon), Trans. Am. Ent. Soc., vi, 184, ♀.
1043. New York. In good condition.
nasutus (Mesoleptus?), Trans. Am. Ent. Soc., ii, 103, ♂ ♀.
Pennsylvania. Not found.
nasutus (Tryphon?), Trans. Am. Ent. Soc., ii, 107, ♀.
1341. Illinois. Head and right anterior wing off.
nefastus (Campoplex), Proc. Acad. Nat. Sci., 1873, 385, ♂.
855. Cordova, Mexico. In good condition.
nestor (Ichneumon), Trans. Am. Ent. Soc., ii, 13, ♀.
676. Cordova, Mexico. In good condition.
neutralis (Ichneumon), Proc. Acad. Nat. Sci., 1878, 349, ♂.
1044. California. Antennae imperfect.
nevadensis (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxvii, ♀ ♂.
1198 ♀. Nevada. Extreme tips of antennae off.
niger (Echthrus), Can. Ent., i, 37, ♀ ♂.
1528 ♀. Ottawa, Ontario, Canada. Right antenna off.
niger (Exetastes), Proc. Ent. Soc. Phil., iv, 275, ♀ ♂.
1607 ♀. Colorado. In good condition.
niger (Thyreodon), Proc. Acad. Nat. Sci., 1873, 375, ♂ ♀.
75 ♀. Cordova, Mexico. In good condition.
nigricans (Cremastus), Proc. Ent. Soc. Phil., iv, 286, ♀.
1553. Colorado. In good condition. Described as a variety of *fulvescens* Cress.
nigripes (Mesoleptus), Proc. Ent. Soc. Phil., iii, 267, ♀.
1564. Illinois. Abdomen off beyond first segment.
nigrita (Arenetra), Trans. Am. Ent. Soc., iii, 159, ♀ ♂.
1471 ♀. Massachusetts. In good condition.
nigrocaeruleus (Patroclus), Proc. Acad. Nat. Sci., 1873, 104, ♀.
655. Orizaba, Mexico. Legs more or less broken.

nigrofemoratus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 122, ♂.
696. Orizaba, Mexico. In good condition.
nigrovittata (Eiphosoma), Proc. Ent. Soc. Phil., iv, 55, ♀.
894. Cuba. Left antenna, tip of right antenna, and left posterior legs, except coxa, off.
nitida (Rhyssa), Proc. Ent. Soc. Phil., iii, 319, ♂.
1441. Virginia. Left antenna broken.
nobilis (Ichneumon), Proc. Ent. Soc. Phil., iii, 155, ♂.
1042. Illinois. In good condition. Name preoccupied; renamed *munificus* Cress.
nortoni (Ichneumon), Trans. Am. Ent. Soc., i, 304, ♀.
1300. Connecticut. In good condition.
nortoni (Rhyssa), Proc. Ent. Soc. Phil., iii, 317, ♀.
1442. Colorado. In good condition.
notanda (Pimpla), Trans. Am. Ent. Soc., iii, 148, ♀ ♂.
1422 ♀. Pennsylvania. In good condition.
novatus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 159, ♀.
796. Mirador, Mexico. In good condition.
novita (Pimpla), Trans. Am. Ent. Soc., iii, 146, ♀.
1417. Massachusetts. In good condition.
nubecula (Christolia), Proc. Acad. Nat. Sci., 1873, 163, ♀.
805. Orizaba, Mexico. In good condition.
nubecula (Pimpla), Proc. Ent. Soc. Phil., iv, 196 (Corrigenda).
See *terminalis* ||Cress.
nubilipennis (Cryptus), Proc. Ent. Soc. Phil., iii, 291, ♀.
1531. Colorado. Antennae broken.
nubilipennis (Mesostenus), Can. Ent., x, 205, ♀.
1184. Georgia. Tips of antennae off.
nubivagus (Amblyteles), Trans. Am. Ent. Soc., vi, 193, ♂.
See *consimilis* ||(Ichneumon) Cress.
nuncius (Ichneumon), Proc. Acad. Nat. Sci., 1878, 352, ♂.
1045. California. In good condition.
obliquus (Mesochorus), Can. Ent., iv, 24, ♀.
1590. Pennsylvania. In good condition.
obilteratus (Ichneumon), Proc. Ent. Soc. Phil., iii, 147, ♂.
1287. Colorado. In good condition. Name preoccupied; renamed *expunctus* Cress.
obilteratus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 260, ♀.
1562. Illinois. Apical half of antennae and the posterior legs off.
obscurata (Pimpla), Proc. Ent. Soc. Phil., iv, 36, ♀.
Cuba. In Gundlach Collection.
obscurellus (Erromenus), Proc. Acad. Nat. Sci., 1878, 373, ♀.
1359. California. Tips of antennae off, also left anterior wing.
obscurellus (Phytodietus), Proc. Acad. Nat. Sci., 1878, 379, ♀.
1511. California. In good condition.

obscurus (Exetastes), Proc. Ent. Soc. Phil., iv, 281, ♀.
1619. Colorado. In good condition.
obscurus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 261, ♀.
1569. Illinois. Tip of left antenna off.
obscurus (Pezomachus), Can. Ent., iv, 62, ♀.
1211. New Jersey. In good condition.
obscurus (Stilpnus), Proc. Ent. Soc. Phil., iv, 259, ♂.
Colorado. Not found.
occidentale (Exochilum), Proc. Acad. Nat. Sci., 1878, 366, ♀.
1632. Oregon. Right antenna off; right upper wing detached.
occidentalis (Coleocentrus), Proc. Acad. Nat. Sci., 1878, 376, ♀.
1431. Vancouver Island, British Columbia. In good condition.
occidentalis (Cylloceria), Trans. Am. Ent. Soc., iii, 160, ♀ ♂.
1474 ♀. Pennsylvania. In good condition.
occidentalis (Ephialtes), Proc. Ent. Soc. Phil., iv, 269, ♀.
1535. Colorado. Apical two-thirds of antennae off.
occidentalis (Lampronota), Trans. Am. Ent. Soc., iii, 161, ♀.
1513. Pennsylvania. In good condition.
occidentalis (Trogus), Trans. Am. Ent. Soc., ii. 93, ♂.
1278. Dakota. Both antennae off.
occidentalis (Tryphon), Trans. Am. Ent. Soc., ii, 109, ♀.
1355. Illinois. In good condition.
occidentalis (Xorides), Proc. Acad. Nat. Sci., 1878, 380, ♀.
1515. Vancouver Island, British Columbia. Both antennae broken, and right posterior leg off.
occiputalis (Hoplismenus), Trans. Am. Ent. Soc., ii, 24, ♂ ♀.
724 ♂. Cordova, Mexico. In good condition.
odiosus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 348, ♂.
1046. California. Right antenna off.
ontario (Pimpla), Trans. Am. Ent. Soc., iii, 146, ♂.
1415. Canada. Right antenna off.
opaculus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 115, ♂ ♀.
671 ♂. Mexico. In good condition.
opimus (Campoplex), Proc. Acad. Nat. Sci., 1873, 382, ♀.
843. Cordova, Mexico. In good condition.
orbitalis (Anomalon), Trans. Am. Ent. Soc., iv, 170, ♂.
1546. Texas. In good condition.
orbitalis (Bassus), Proc. Ent. Soc. Phil., iv, 272, ♀.
1119. Colorado. Left antenna off.
orbitalis (Cteniscus), Proc. Ent. Soc. Phil., iii, 283, ♂.
1331. Pennsylvania. In good condition.
orbitalis (Lampronota), Proc. Acad. Nat. Sci., 1873, 408, ♀.
639. Orizaba, Mexico. Tip of left antenna off, also abdomen and posterior legs.

orbitalis (Meniscus?), Proc. Acad. Nat. Sci., 1873, 411, ♀.
644. Cordova, Mexico. Tip of left antenna off.
orbitalis (Porizon), Trans. Am. Ent. Soc., iv, 174, ♀ ♂.
1601 ♀. Texas. In good condition.
ormenus (Ichneumon), Proc. Ent. Soc. Phil., iii, 141, ♀.
1302. Pennsylvania. In good condition.
ornatipennis (Cryptus?), Proc. Ent. Soc. Phil., iv, 21, ♀, fig. 4.
896. Cuba. In good condition.
ornatipennis (Thyreodon), Proc. Acad. Nat. Sci., 1873, 376, ♀.
74. Orizaba, Mexico. In good condition.
ornatipes (Ichneumon), Trans. Am. Ent. Soc., i, 294, ♂.
1047. West Virginia. Tip of left antenna off.
ornatus (Hoplismenus), Trans. Am. Ent. Soc., ii, 92, ♀.
1244. New York. In good condition.
orpheus (Ichneumon), Proc. Ent. Soc. Phil., iii, 136, ♀.
1048. Pennsylvania. In good condition.
otomitus (Hoplismenus), Trans. Am. Ent. Soc., ii, 21, ♀.
659. Cordova, Mexico. In good condition.
oxylus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 262, ♀ ♂.
1570 ♀. Delaware. In good condition.
pachymenae (Cryptanura?), Proc. Acad. Nat. Sci., 1873, 168, ♂ ♀.
814 ♀. Mexico. Tips of antennae off.
pacificus (Bassus), Proc. Acad. Nat. Sci., 1878, 376, ♂ ♀.
1120 ♀. California. Upper left wing off.
pacificus (Cryptus), Proc. Acad. Nat. Sci., 1878, 361, ♂.
1145. California. Apical half of right antenna off.
pacificus (Hoplismenus), Proc. Acad. Nat. Sci., 1878, 354, ♀ ♂.
1245 ♀. Vancouver Island, British Columbia. In good condition.
pacificus (Pristomerus), Proc. Acad. Nat. Sci., 1878, 370, ♀.
1606. California. In good condition.
pallidus (Cryptus), Proc. Ent. Soc. Phil., iii, 307, ♀.
1146. Delaware. In good condition.
pallidus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 148, ♂.
775. Cordova, Mexico. Left anterior wing off.
pallipes (Exochus), Proc. Ent. Soc. Phil., iii, 287, ♂.
1322. Illinois. Right wings off.
pallitarse (Anomalon), Trans. Am. Ent. Soc., iv, 170, ♂.
1542. Texas. In good condition.
paludatus (Mesostenus), Trans. Am. Ent. Soc., iv, 162, ♂.
1185. Comal County, Texas. In good condition.
parandus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 124, ♂.
702. Mexico. In good condition.
parredes (Ichneumon), Trans. Am. Ent. Soc., ii, 4, ♀.
652. Cordova, Mexico. In good condition.

parva (Glypta?), Trans. Am. Ent. Soc., iii, 155, ♀.
1440. Illinois. Right antenna broken.

parva (Lampronota), Trans. Am. Ent. Soc., iii, 163, ♀.
1480. Delaware. In good condition.

parvus (Ichneumon), Proc. Ent. Soc. Phil., iii, 159, ♂.
1049. Illinois. In good condition.

passivus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 113, ♀.
664. Orizaba, Mexico. Tip of right antenna off.

patruelis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 170, ♀.
816. Orizaba, Mexico. Right posterior tarsus off.

paululus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 145, ♀.
768. Cordova, Mexico. Tips of antennae off.

pedalis (Campoplex?), Proc. Ent. Soc. Phil., iv, 43, ♂.
Cuba. In Gundlach Collection.

pedalis (Ichneumon), Proc. Ent. Soc. Phil., iii, 141, ♂.
1050. Colorado. In good condition.

pedalis (Pimpla), Proc. Ent. Soc. Phil., iv, 268, ♂.
1411. Colorado. Right antenna off.

pedalis (Tryphon), Proc. Ent. Soc. Phil., iii, 273, ♂.
1363. Illinois. Both antennae off.

pepticus (Ichneumon), Trans. Am. Ent. Soc., vi, 148, ♂.
1051. Illinois. In good condition.

peregrinus (Mesoleptus?), Trans. Am. Ent. Soc., ii, 102, ♀ ♂.
1633 ♂. Connecticut. Tips of antennae off.

peritum (Anomalon), Proc. Acad. Nat. Sci., 1873, 377, ♀.
835. Mirador, Mexico. In good condition.

perlongus (Ephialtes), Trans. Am. Ent. Soc., iii, 143, ♂.
1536. Massachusetts. In good condition.

perplexus (Cryptus), Proc. Acad. Nat. Sci., 1878, 359, ♀.
1147. California. In good condition.

persimilis (Cryptus), Proc. Ent. Soc. Phil., iii, 298, ♀.
1148. Delaware. In good condition.

pertenuis (Mesostenus), Proc. Acad. Nat. Sci., 1873, 162, ♂.
802. Cordova, Mexico. Antennae more or less broken.

pertinax (Mesostenus), Trans. Am. Ent. Soc., iv, 163, ♀.
Texas. In Belfrage Collection; type No. 1429, U. S. N. M. "Left antenna broken at annulus; abdomen loose, but attached."

pervagus (Ichneumon), Trans. Am. Ent. Soc., vi, 148, ♂.
1052. Canada. Right antenna broken.

pettitii (Coleocentrus), Can. Ent., i, 35, ♀.
1430. Grimsby, Ontario, Canada. Abdomen detached.

pettitii (Pezomachus), Can. Ent., iv, 61, ♀.
1212. Ontario, Canada. In good condition.

petulca (Pimpla), Trans. Am. Ent. Soc., iv, 165, ♀.
Texas. In Belfrage Collection; type No. 1609, U. S. N. M. "Condition good."
petulcus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 354, ♀.
1053. Santa Barbara, California. Both antennae off.
philanthoides (Tryphon), Trans. Am. Ent. Soc., ii, 110, ♀.
1279. Illinois. In good condition.
piceus (Cremastus), Trans. Am. Ent. Soc., iv, 176, ♀.
Texas. Belfrage Collection. "Not found."
picticornis (Pimpla), Trans. Am. Ent. Soc., iii, 146, ♂.
1416. New Jersey. In good condition.
pictifrons (Cryptus), Proc. Acad. Nat. Sci., 1878, 360, ♂.
1149. Green River, Wyoming. In good condition.
pictifrons (Ichneumon), Proc. Ent. Soc. Phil., iii, 160, ♂.
1054. Colorado. In good condition.
picturatus (Hoplismenus), Trans. Am. Ent. Soc., ii, 22, ♀.
717. Cordova, Mexico. In good condition.
placitus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 121, ♀.
694. Mirador, Mexico. In good condition.
pleuralis (Bassus), Trans. Am. Ent. Soc., ii, 111, ♀.
1121. Ohio. Tips of antennae and left hind legs, off.
pleuralis (Exochus), Proc. Ent. Soc. Phil., iii, 286, ♂.
1323. Illinois. Tips of wings broken.
pleuralis (Lampronota), Trans. Am. Ent. Soc., iii, 161, ♀ ♂.
1475 ♀. Pennsylvania. In good condition.
pleuralis (Perithous), Can. Ent., i, 36, ♀.
Grimsby, Ontario, Canada. Not found.
pleuralis (Phytodietus), Proc. Ent. Soc. Phil., iv, 266, ♂.
1510. Colorado. Tip of right antenna and right posterior tarsus, off.
pleuralis (Tryphon), Proc. Ent. Soc. Phil., iii, 275, ♀.
1403. New Jersey. Both antennae off.
porrectus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 266, ♀.
1571. Delaware. In good condition.
pravus (Ichneumon), Trans. Am. Ent. Soc., vi, 151, ♀.
1055. Canada. In good condition.
procax (Ichneumon), Trans. Am. Ent. Soc., vi, 170, ♂.
1056. Canada. In good condition.
prolixus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 118, ♂.
686. Cordova, Mexico. In good condition.
promptus (Ichneumon), Trans. Am. Ent. Soc., vi, 152, ♀ ♂.
1057 ♀. White Mountains, New Hampshire. In good condition.
promptus (Mesostenus), Can. Ent., x, 209, ♂.
1186. Illinois. In good condition.
propinquum (Anomalon), Proc. Ent. Soc. Phil., iv, 284, ♂.
1545. Colorado. In good condition.

propinquus (Exochus), Trans. Am. Ent. Soc., ii, 114, ♂ ♀.
1324 ♀. Connecticut. Left antenna broken.

propinquus (Hoplismenus), Trans. Am. Ent. Soc., ii, 22, ♀.
716. Cordova, Mexico. In good condition.

propinquus (Ichneumon), Proc. Ent. Soc. Phil., iii, 172, ♀.
1303. Colorado. In good condition.

propinquus (Mesoleptus), Trans. Am. Ent. Soc., ii, 97, ♂.
1370. Delaware. Both antennae off.

propinquus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 152, ♀ ♂.
780 ♀. Cordova, Mexico. In good condition.

propitius (Ichneumon), Trans. Am. Ent. Soc., iv, 156, ♂.
Texas. In Belfrage Collection; type No. 1567, U. S. N. M. "Antennae gone; head partly eaten." One specimen in the Society's collection, from Montana, in good condition.

proximus (Cryptus), Proc. Ent. Soc. Phil., iii, 290, ♀.
1150. Colorado. Tip of right antenna off.

proximus (Ischnus), Proc. Ent. Soc. Phil., iii, 187, ♂.
1481. Pennsylvania. Both antennae off.

puerilis (Ichneumon), Trans. Am. Ent. Soc., i, 296, ♂.
1058. Canada. In good condition.

pulchella (Lampronota), Trans. Am. Ent. Soc., iii, 162, ♂.
1476. New Jersey. In good condition.

pulcheilus (Metopius), Proc. Ent. Soc. Phil., iv, 271, ♀.
1199. Colorado. In good condition.

pulcherrima (Pimpla?), Proc. Acad. Nat. Sci., 1873, 404, ♀.
616. Cordova, Mexico. In good condition.

pulcherrimus (Mesoleptus), Trans. Am. Ent. Soc., ii, 101, ♂.
1509. Connecticut. In good condition.

pulchripennis (Cryptus), Proc. Acad. Nat. Sci., 1873, 137, ♀.
756. Orizaba, Mexico. In good condition.

pulchripes (Exochus), Trans. Am. Ent. Soc., ii, 38, ♂.
879. Cordova, Mexico. Head off.

pulchripes (Glypta), Trans. Am. Ent. Soc., iii, 153, ♀.
1447. West Virginia. In good condition.

pullatus (Ichneumon), Proc. Ent. Soc. Phil., iii, 146, ♂.
1320. Illinois. In good condition.

pumilus (Cryptus), Proc. Ent. Soc. Phil., iii, 301, ♀.
1151. Delaware. In good condition.

punctulata (Lampronota), Trans. Am. Ent. Soc., iii, 163, ♀.
1482. Massachusetts. In good condition.

punicipes (Pimpla), Proc. Acad. Nat. Sci., 1873, 398, ♀.
604. Orizaba, Mexico. In good condition.

punicus (Cryptus), Proc. Acad. Nat. Sci., 1878, 364, ♀ ♂.
1152 ♀. California. Left antenna off.

purpuripennis (Cryptus), Proc. Acad. Nat. Sci., 1878, 364, ♀.
1153. California. Apical half of left antenna off.
purpuripennis (Ichneumon), Proc. Acad. Nat. Sci., 1878, 350, ♀.
1059. California. In good condition.
pusillus (Cryptus), Proc. Ent. Soc. Phil., iii, 302, ♀.
1154. Illinois. Tips of antennae and left posterior legs, off.
pusillus (Ichneumon), Proc. Ent. Soc. Phil., iii, 171, ♀.
1060. Delaware. In good condition.
pusillus (Mesostenus), Proc. Ent. Soc. Phil., iv, 31, ♀.
Cuba. In Gundlach Collection.
pusillus (Trogus), Proc. Ent. Soc. Phil., iv, 19, ♂.
Cuba. In Gundlach Collection.
putus (Ichneumon), Trans. Am. Ent. Soc., vi, 173, ♀.
1061. Connecticut. Tips of antennae off and hind tarsi detached.
pygmaeus (Exochus), Proc. Ent. Soc. Phil., iii, 285, ♂.
1316. Illinois. In good condition.
quadriceps (Ichneumon), Trans. Am. Ent. Soc., i, 312, ♀ ♂.
1304 ♀. Canada. In good condition.
rarus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 171, ♂.
818. Orizaba, Mexico. Tips of antennae off, also middle right leg.
recens (Ichneumon), Trans. Am. Ent. Soc., vi, 153, ♂.
1062. West Virginia. In good condition.
regnatrix (Ichneumon), Proc. Ent. Soc. Phil., iii, 178, ♀.
1437. Delaware. In good condition.
relativus (Cryptus), Proc. Acad. Nat. Sci., 1878, 359, ♀.
1155. British Columbia. Apical half of right antenna off.
reliquus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 146, ♂.
770. Orizaba, Mexico. In good condition.
residuum (Anomalon), Proc. Acad. Nat. Sci., 1873, 378, ♀.
836. Orizaba, Mexico. In good condition.
resolutus (Cryptus), Proc. Acad. Nat. Sci., 1878, 363, ♂.
1156. California. In good condition.
restrictus (Ichneumon), Trans. Am. Ent. Soc., vi, 169, ♂.
1063. New York. Tips of antennae off.
reticulatus (Trachynotus), Proc. Ent. Soc. Phil., iv, 285, ♂.
1630. Colorado. In good condition.
retiniae (Cremastus), Rep. Ent. U. S. Dept. Agric., 1879, 238, ♂.
Ithaca, New York. In U. S. Nat. Mus.; head wanting.
rileyi (Trogus), Trans. Am. Ent. Soc., ii, 95, ♀.
Illinois. Collection C. V. Riley. Not in U. S. Nat. Mus.
rivalis (Limneria), Trans. Am. Ent. Soc., iv, 173, ♂ ♀.
Texas. In Belfrage Collection; type No. 1588, U. S. N. M., "♂ abdomen gone."
rixosus (Hoplismenus), Trans. Am. Ent. Soc., ii, 20, ♀.
714. Cordova, Mexico. In good condition.

robustus (Cryptus), Proc. Ent. Soc. Phil., iii, 289, ♀.
1157. Colorado. In good condition.
robustus (Ichneumon), Trans. Am. Ent. Soc., i, 298, ♀.
1305. Canada. In good condition.
robustus (Mesostenus), Proc. Ent. Soc. Phil., iv, 25, ♀.
Cuba. In Gundlach Collection.
robustus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxvii, ♀.
1200. Maryland. In good condition.
rogalis (Ichneumon), Trans. Am. Ent. Soc., i, 295, ♂.
1306. West Virginia. Tip of right antenna off.
rotundiceps (Mesoleptus?), Trans. Am. Ent. Soc., iv, 167, ♂.
Texas. In Belfrage Collection; type No. 1602, U. S. N. M. "Head glued on label; antenna (left) wanting beyond second joint, right beyond fifth."
rubellus (Ichneumon), Proc. Ent. Soc. Phil., iv, 254, ♂.
1064. Colorado. In good condition.
rubicundus (Ichneumon), Proc. Ent. Soc. Phil., iii, 176, ♀.
1065. Illinois. In good condition.
rubiginosus (Mesoleius?), Proc. Acad. Nat. Sci., 1878, 372, ♂.
1405. California. In good condition.
rubrica (Lampronota), Trans. Am. Ent. Soc., iii, 165, ♀.
1493. West Virginia. Apex of abdomen off, and venter eaten.
rubriceps (Joppidium), Trans. Am. Ent. Soc., iv, 160, ♀ ♂.
1641 ♀. Texas. Tips of wings torn.
rubripes (Glypta), Trans. Am. Ent. Soc., iii, 156, ♀ ♂.
1455 ♀. Canada. In good condition.
rufescens (Ephialtes), Proc. Ent. Soc. Phil., iv, 38, ♀.
622. Cuba. In good condition.
rufipes (Arenetra), Trans. Am. Ent. Soc., iii, 159, ♀.
1472. Maine. In good condition.
rufipes (Exetastes), Proc. Ent. Soc. Phil., iv, 277, ♀ (Note).
1613. Colorado. In good condition. Described as a variety of *abdominalis* Cress.
rufipes (Lissonota), Can. Ent., i, 36, ♀.
1484. Grimsby, Ontario, Canada. In good condition.
rufipes (Metopius), Proc. Ent. Soc. Phil., iv, 270, ♀.
1201. Colorado. Right antenna off.
rufiscutellaris (Glypta), Trans. Am. Ent. Soc., iii, 153, ♀ ♂.
1448 ♀. Illinois. In good condition.
rufithoracicus (Tryphon?), Trans. Am. Ent. Soc., ii, 107, ♂.
Cuba. In Gundlach Collection.
rufithorax (Lampronota), Proc. Ent. Soc. Phil., iv, 40, ♂.
Cuba. In Gundlach Collection.
rufizonatus (Ichneumon), Proc. Ent. Soc. Phil., iii, 183, ♀.
1307. New Jersey. In good condition.

rufocinctus (Tryphon), Proc. Ent. Soc. Phil., iii, 280, ♀.
1380. Illinois. In good condition.
rufofasciata (Glypta), Trans. Am. Ent. Soc., iii, 158, ♂.
1462. Illinois. Right antenna detached.
rufoniger (Pimpla), Proc. Ent. Soc. Phil., iv, 35, ♀.
619. Cuba. In good condition.
rufopectus (Pimpla), Trans. Am. Ent. Soc., iii, 148, ♀.
1420. Pennsylvania. In good condition.
rufovariata (Pimpla), Trans. Am. Ent. Soc., iii, 149, ♀.
1419. Pennsylvania. In good condition.
rupinsulensis (Acaenites), Trans. Am. Ent. Soc., iii, 143, ♀.
2049. Illinois. In good condition.
russatus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 353, ♀.
1066. Vancouver Island, British Columbia. In good condition.
rutilus (Ichneumon), Proc. Ent. Soc. Phil., iii, 169, ♀.
1067. Virginia. In good condition.
saevus (Ichneumon), Trans. Am. Ent. Soc., i, 296, ♀.
1068. Illinois. In good condition.
sagus (Ichneumon), Trans. Am. Ent. Soc., i, 294, ♀.
1069. Illinois. In good condition.
salvus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 349, ♂.
1070. Vancouver Island, British Columbia. Tips of antennae off.
sandix (Ichneumon), Proc. Ent. Soc. Phil., iii, 174, ♀.
1071. New York. Right antenna off; wings and legs more or less broken.
sanguinipes (Pimpla), Trans. Am. Ent. Soc., iv, 165, ♀.
Texas. In Belfrage Collection; type No. 12,277, U. S. N. M. "Antennae broken beyond fifth joint; tip of abdomen gone."
satageus (Phygadeuon), Proc. Acad. Nat. Sci., 1873, 140, ♀.
760. Cordova, Mexico. In good condition.
saucius (Ichneumon), Proc. Ent. Soc. Phil., iii, 137, ♀.
1072. Pennsylvania. In good condition.
saundersi (Mesostenus), Can. Ent., x, 208, ♀.
1187. Canada West. Tip of right antenna off.
saundersii (Ichneumon), Trans. Am. Ent. Soc., vi, 177, ♂.
1073. Canada. In good condition.
scapularis (Mesoleptus), Trans. Am. Ent. Soc., ii, 98, ♂.
1382. Connecticut. Left antenna broken, also posterior tarsi.
scelerosum (Anomalon), Proc. Acad. Nat. Sci., 1873, 378, ♂ ♀.
837 ♀. Orizaba, Mexico. Left antenna off, also left posterior leg.
scelestus (Ichneumon), Proc. Ent. Soc. Phil., iii, 148, ♀.
1074. Illinois. In good condition.
scibilis (Ichneumon), Trans. Am. Ent. Soc., vi, 183, ♂.
1075. Illinois. In good condition.

scitula (Glypta), Trans. Am. Ent. Soc., iii, 155, ♀.
1464. New Jersey. In good condition.
scitulus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 174, ♀.
826. Orizaba, Mexico. Both antennae off.
scitulus (Ischnus), Proc. Ent. Soc. Phil., iii, 193, ♂.
1249. Illinois. In good condition.
scitulus (Mesochorus), Can. Ent., iv, 24, ♂ ♀.
1592 ♀. Pennsylvania. In good condition.
scitulus (Metopius), Proc. Ent. Sec. A. N. S., 1879, xxix, ♂.
1202. Nevada. Right antenna off.
scriptifrons (Ichneumon), Trans. Am. Ent. Soc., vi, 144, ♂.
1076. Canada. In good condition.
scriptifrons (Pimpla), Trans. Am. Ent. Soc., iii, 148, ♀.
1640. Delaware. Both antennae broken.
scutatifrons (Metopius), Proc. Acad. Nat. Sci., 1873, 393, ♂.
881. Orizaba, Mexico. In good condition.
scutellaris (Bassus), Trans. Am. Ent. Soc., ii, 112, ♂ ♀.
1122 ♀. Illinois. Left hind tarsus off.
scutellaris (Exetastes), Proc. Ent. Soc. Phil., iv, 279, ♀ ♂
1620 ♀. Colorado. Tip of right antenna off.
scutellaris (Hoplismenus), Trans. Am. Ent. Soc., ii, 26, ♂
726. Cordova, Mexico. In good condition.
scutellaris (Lampronota), Trans. Am. Ent. Soc., iii, 161, ♀.
1502. Illinois. In good condition.
scutellaris (Tryphon), Trans. Am. Ent. Soc., ii, 104, ♀.
1362. Connecticut. In good condition.
seditiosus (Ichneumon), Trans. Am. Ent. Soc., vi, 172, ♀.
1077. Colorado. In good condition.
sedulus (Mesoleptus), Trans. Am. Ent. Soc., ii, 97, ♂.
1371. Massachusetts. Apical half of right antenna off.
segnis (Lampronota), Proc. Acad. Nat. Sci., 1878, 378, ♂.
1499. Vancouver Island, British Columbia. In good condition.
semialbus (Mesostenus), Proc. Ent. Soc. Phil., iv, 30, ♀ ♂.
889 ♀. Cuba. In good condition.
semicaeruleus (Ichneumon), Trans. Am. Ent. Soc., i, 302, ♀.
1308. West Virginia. In good condition.
semicoccineus (Ichneumon), Proc. Ent. Soc. Phil., iii, 179, ♂.
1461. Virginia. In good condition.
semilaevis (Ichneumon), Proc. Ent. Soc. Phil., iii, 142, ♀.
1078 Colorado. In good condition.
seminiger (Cremastus), Proc. Ent. Soc. Phil., iv, 286, ♂ ♀.
1552 ♀. Colorado. In good condition. Described as a variety of *fulvescens* Cress.

seminiger (Ichneumon), Proc. Ent. Soc. Phil., iii, 167, ♀.
1079. Virginia. Apical half of right antenna detached.
seminiger (Tryphon), Proc. Ent. Soc. Phil., iii, 278, ♀.
1374. Illinois. Left antenna off.
semirufus (Exochus), Trans. Am. Ent. Soc., ii, 114, ♂ ♀.
1326 ♀. New York. In good condition.
semirufus (Tryphon), Proc. Ent. Soc. Phil., iii, 278, ♀.
1378. Illinois. In good condition.
semisanguinea (Pimpla), Proc. Acad. Nat. Sci., 1873, 400, ♀.
608. Orizaba, Mexico. In good condition.
semissis (Ichneumon), Proc. Acad. Nat. Sci., 1878, 354, ♀.
1080. Mohave Desert, California. In good condition.
sequax (Ichneumon), Proc. Acad. Nat. Sci., 1878, 352, ♀.
1081. Vancouver Island, British Columbia. Right wings off.
serricornis (Ichneumon), Proc. Ent. Soc. Phil., iv, 13, ♂.
901. Cuba. Left posterior tarsus off.
servilis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 176, ♀.
831. Cordova, Mexico. Apical half of left antenna off.
signatipes (Ichneumon), Trans. Am. Ent. Soc., i, 308, ♀.
1644. Pennsylvania. In good condition.
signatipes (Tryphon), Trans. Am. Ent. Soc., ii, 105, ♀.
1369. Hudson Bay Territory. Left antenna off.
similis (Cryptus), Proc. Ent. Soc. Phil., iii, 299, ♀.
1158. Delaware. In good condition.
simplicipes (Glypta), Trans. Am. Ent. Soc., iii, 156, ♀ ♂.
1454 ♀. Illinois. In good condition.
similans (Ichneumon), Proc. Acad. Nat. Sci., 1873, 128, ♂.
727. Mirador, Mexico. In good condition.
solitarius (Ichneumon), Proc. Acad. Nat. Sci., 1873, 118, ♂.
685. Orizaba, Mexico. In good condition.
solitus (Ichneumon), Proc. Acad. Nat. Sci., 1878, 348, ♀.
1082. Lake Lahache, British Columbia. Left wings off.
soror (Cryptus), Proc. Ent. Soc. Phil., iii, 296, ♂.
1159. Delaware. In good condition.
soror (Ichneumon), Proc. Ent. Soc. Phil., iii, 185, ♀.
1083. Delaware. In good condition.
sororius (Cryptus), Trans. Am. Ent. Soc., iv, 159, ♂.
1160. Texas. In good condition.
sororius (Oedicephalus), Trans. Am. Ent. Soc., ii, 28, ♀.
735. Cordova, Mexico. Tips of antennae off.
speciosa (Epirhyssa), Proc. Ent. Soc. Phil., iv, 39, ♀ ♂.
601 ♂. Cuba. In good condition; ♀ in Gundlach Collection.
spinosus (Banchus), Proc. Ent. Soc. Phil., iv, 274, ♂.
1625. Colorado. In good condition.

stigmaterus (Mesoleptus?), Trans. Am. Ent. Soc., iv, 167, ♂.
Texas. In Belfrage Collection; type No. 1603, U. S. N. M. "Condition good."

stigmaterus (Porizon), Trans. Am. Ent. Soc., iv, 174, ♂ ♀.
1602 ♀. Texas. In good condition.

strenuus (Mesostenus), Proc. Ent. Soc. Phil., iv, 26, ♂.
Cuba. In Gundlach Collection.

stretchii (Mesoleius), Proc. Acad. Nat. Sci., 1878, 371, ♀.
1345. California. Both antennae broken.

strigosus (Mesoleptus?), Trans. Am. Ent. Soc., iv, 167, ♂.
Texas. In Belfrage Collection; type No. 1604, U. S. N. M. "Left antenna gone beyond third joint."

stupidus (Mesostenus), Proc. Acad. Nat. Sci., 1873, 159, ♀.
797. Orizaba, Mexico. Right hind leg off beyond coxa.

stygicus (Ichneumon), Trans. Am. Ent. Soc., vi, 151, ♀.
Not a type. Change of name for *signatipes* Prov., (*nec* Cress.), preoccupied.

suadus (Ichneumon), Trans. Am. Ent. Soc., vi, 160, ♂.
1084. Canada. In good condition.

subargenteus (Cryptus), Proc. Ent. Soc. Phil., iii, 302, ♀.
1161. Pennsylvania. Legs more or less broken.

subcrassus (Tryphon), Trans. Am. Ent. Soc., ii, 109, ♂ ♀.
1356 ♀. Massachusetts. In good condition.

subcyaneus (Ichneumon), Proc. Ent. Soc. Phil., iii, 148, ♀.
New Jersey. Not found. Specimens in the Society's Collection, in good condition, from other states.

subdolus (Ichneumon), Trans. Am. Ent. Soc., i, 298, ♀.
1085. Massachusetts. Middle right tarsus broken.

subflavescens (Hemiteles), Proc. Ent. Soc. Phil., iv, 24, ♂.
885. Cuba. Tips of antennae, and left anterior wing, off.

subfulvus (Ichneumon), Proc. Ent. Soc. Phil., iv, 258, ♀.
1086. Colorado. In good condition.

subfuscus (Ichneumon), Proc. Ent. Soc. Phil., iii, 173, ♀.
1309. Colorado. In good condition.

subfuscus (Paniscus), Proc. Ent. Soc. Phil., iv, 57, ♀.
895. Cuba. Tip of left antenna, and right posterior tarsus, off.

subfuscus (Phygadeuon), Proc. Ent. Soc. Phil., iii, 311, ♀.
1226. Illinois. In good condition.

subgracilis (Cryptus), Proc. Ent. Soc. Phil., iii, 303, ♀.
1162. Illinois. In good condition.

sublatus (Ischnus), Proc. Ent. Soc. Phil., iii, 186, ♂.
1250. Illinois. In good condition.

submarginatus (Tryphon?), Proc. Ent. Soc. Phil., iii, 274, ♂.
1383. Illinois. In good condition.

subrubidus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 264, ♂.
1566. Illinois. In good condition.

subrufus (Ichneumon), Proc. Ent. Soc. Phil., iii, 168, ♀.
1310. Virginia. In good condition.
subspinosus (Ichneumon), Trans. Am. Ent. Soc., ii, 17, ♂.
674. Cordova, Mexico. In good condition.
subtenuis (Mesoleptus), Proc. Ent. Soc. Phil., iii, 267, ♂.
1572. Illinois. Antennae off, also right wings.
subtenuis (Mesostenus), Proc. Ent. Soc. Phil., iv, 29, ♂.
888. Cuba. Right posterior leg detached.
sulsus (Hemiteles), Proc. Acad. Nat. Sci., 1873, 175, ♀.
829. Orizaba, Mexico. Right antenna and apical third of left antenna off.
sumichrasti (Cryptanura), Proc. Acad. Nat. Sci., 1873, 166, ♂ ♀.
811 ♀. Orizaba, Mexico. In good condition.
sumichrasti (Joppa), Trans. Am. Ent. Soc., ii, 31, ♂ ♀.
740 ♀. Cordova, Mexico. In good condition.
sumichrasti (Pimpla), Proc. Acad. Nat. Sci., 1873, 400, ♀.
609. Cordova, Mexico. In good condition.
superbus (Banchus), Proc. Ent. Soc., Phil. iv, 273, ♂.
1624. Colorado. In good condition.
syphax (Ichneumon), Proc. Ent. Soc. Phil., iii, 181, ♀.
1584. Delaware. In good condition.
tacubaya (Theronia), Proc. Acad. Nat. Sci., 1873, 397, ♂ ♀.
631 ♀. Mexico. In good condition.
tantillus (Cryptus), Proc. Acad. Nat. Sci., 1873, 134, ♂.
749. Cordova, Mexico. Tips of antennae off.
tantillus (Pezomachus), Can. Ent., iv, 62, ♀.
1213. Illinois. Tip of left antenna off.
taos (Amblyteles), Trans. Am. Ent. Soc., vi, 191, ♀.
1242. New Mexico. In good condition.
tarsalis (Exetastes), Proc. Acad. Nat. Sci., 1873, 389, ♂ ♀.
870 ♀. Cordova, Mexico. In good condition.
tarsalis (Tryphon), Trans. Am. Ent. Soc., ii, 106, ♂ ♀.
1381 ♀. Connecticut. Head and right upper wing off; abdomen detached.
tarsatus (Mesostenus), Proc. Ent. Soc. Phil., iv, 27, ♀.
886. Cuba. In good condition.
tegularis (Lampronota), Trans. Am. Ent. Soc., iii, 163, ♂.
1483. Pennsylvania. In good condition.
tejonensis (Cryptus), Proc. Acad. Nat. Sci., 1878, 360, ♀.
1163. Fort Tejon, California. Both antennae off.
tejonensis (Tryphon), Proc. Acad. Nat. Sci., 1878, 372, ♂.
1368. Fort Tejon, California. Antennae and left wings off.
tenebricus (Ichneumon), Trans. Am. Ent. Soc., ii, 15, 9, ♀.
679 ♀. Cordova, Mexico. In good condition

tenebrosus (Ichneumon), Proc. Ent. Soc. Phil., iii, 145, ♂.
1297. Colorado. Apical half of right antenna off. Name preoccupied; renamed *luctus* Cress.

tenuicinctus (Stilpnus), Trans. Am. Ent. Soc., ii, 33, ♂.
762. Cordova, Mexico. Both antennae off.

tenuicornis (Ichneumon), Trans. Am. Ent. Soc., ii, 9, ♂.
711. Cordova, Mexico. In good condition.

tenuicornis (Pimpla), Proc. Ent. Soc. Phil., iv, 267, ♀.
1414. Colorado. Wings more or less ragged.

tenuiventris (Cryptus), Proc. Acad. Nat. Sci., 1873, 134, ♂.
750. Orizaba, Mexico. In good condition.

tepanecus (Campoplex), Proc. Acad. Nat. Sci., 1873, 382, ♀ ♂.
844 ♀. Orizaba, Mexico. In good condition.

tepanecus (Ichneumon), Trans. Am. Ent. Soc., ii, 5, ♀.
653. Cordova, Mexico. In good condition.

teres (Ichneumon), Trans. Am. Ent. Soc., ii, 18, ♂.
700. Cordova, Mexico. In good condition.

terminalis (Campoplex), Proc. Acad. Nat. Sci., 1873, 383, ♀.
1124. Orizaba, Mexico. In good condition. Described as a variety of *flavipennis* Cress.

terminalis (Ichneumon), Proc. Ent. Soc. Phil., iii, 184, ♀.
1087. Delaware. Right antenna and tip of left broken, also left anterior wing.

terminalis (Pimpla), Proc. Ent. Soc. Phil., iv, 36, ♀.
627. Cuba. In good condition. Name preoccupied; renamed *nubecula* Cress.

texana (Eiphosoma), Trans. Am. Ent. Soc., iv, 176, ♀.
1605. Comal County, Texas. In good condition.

texana (Exochoides), Trans. Am. Ent. Soc., iv, 167, ♂.
1313. Comal County, Texas. In good condition.

texana (Pharsalia), Trans. Am. Ent. Soc., iv, 177, ♀.
1603. Texas. In good condition.

texana (Pimpla), Trans. Am. Ent. Soc., iii, 145, ♀.
1412. Texas. In good condition.

texana (Polysphincta), Trans. Am. Ent. Soc., iii, 149, ♀.
1427. Texas. In good condition.

texanus (Exochus), Trans. Am. Ent. Soc., iv, 168, ♂.
Texas. In Belfrage Collection; type No. 1607, U. S. N. M. "Abdomen broken off but glued on card."

texanus (Ichneumon), Trans. Am. Ent. Soc., vi, 159, ♂.
1088. Texas. In good condition.

texanus (Pezomachus), Can. Ent., iv, 64, ♀.
1214. Texas. Left antenna off.

texanus (Phygadeuon), Trans. Am. Ent. Soc., iv, 160, ♂.
1227. Comal County, Texas. In good condition.

texanus (Trachynotus), Trans. Am. Ent. Soc., iv, 169, ♀.
1631. Texas. In good condition.
thoracicus (Ephialtes), Proc. Acad. Nat. Sci., 1878, 377, ♀.
1539. Vancouver Island, British Columbia. Antennae broken.
thoracicus (Epimecis?), Proc. Acad. Nat. Sci., 1873, 395, ♀.
624. Orizaba, Mexico. In good condition.
thoracicus (Euceros), Can. Ent., i, 105, ♂.
1351. Connecticut. In good condition.
thoracicus (Hemiteles), Proc. Ent. Soc. Phil., iv, 24, ♀.
Cuba. In Gundlach Collection.
thoracicus (Hoplismenus), Proc. Ent. Soc. Phil., iii, 288, ♂.
1573. Pennsylvania. Left antenna off.
thoracicus (Mesostenus), Proc. Ent. Soc. Phil., iii, 314, ♀ ♂.
1188 ♀. Delaware. Tip of right antenna off.
thoracicus (Ophion), Proc. Ent. Soc. Phil., iv, 55.
77. Cuba. In good condition.
thoracicus (Trogus), Proc. Ent. Soc. Phil., iv, 18, ♂.
Cuba. In Gundlach Collection.
tibialis (Bassus), Trans. Am. Ent. Soc., ii, 110, ♀.
1123. Illinois. Antennae and left hind leg off.
tibialis (Charops), Trans. Am. Ent. Soc., iv, 173, ♂.
Texas. Belfrage Collection. "Not found."
tibialis (Tryphon), Proc. Ent. Soc. Phil., iii, 280, ♂.
1364. Illinois. Left antenna broken.
tibiator (Campoplex), Proc. Ent. Soc. Phil., iv, 41, ♀.
Cuba. In Gundlach Collection.
tibiator (Mesoleptus), Proc. Ent. Soc. Phil., iii, 259, ♂.
1559. New Jersey. In good condition.
timidus (Phygadeuon), Trans. Am. Ent. Soc., iv, 161, ♂.
Texas. In Belfrage Collection; type No. 1428, U. S. N. M. "Condition good."
tolteca (Theronia), Proc. Acad. Nat. Sci., 1873, 396, ♂ ♀.
629 ♀. Orizaba, Mexico. In good condition.
toltecus (Ichneumon), Trans. Am. Ent. Soc., ii, 17, ♀ ♂.
657 ♀. Cordova, Mexico. Left hind tarsus off.
toluca (Ichneumon), Trans. Am. Ent. Soc., ii, 6, ♂.
689. Cordova, Mexico. Extreme tips of antennae off.
toros (Ichneumon), Trans. Am. Ent. Soc., ii, 14, ♀.
677. Cordova, Mexico. In good condition.
torvinus (Ichneumon), Trans. Am. Ent. Soc., i, 292, ♂.
1089. Illinois. Tips of antennae and legs more or less broken.
totonacus (Ichneumon), Trans. Am. Ent. Soc., ii, 10, ♂.
658. Cordova, Mexico. Middle and hind legs more or less broken.

totonacus (Mesochorus), Can. Ent., iv, 23; Proc. Acad. Nat. Sci., 1873, 388, ♀.
867. Orizaba, Mexico. Tips of antennae and left posterior leg beyond coxa, off.

tragicus (Ichneumon), Trans. Am. Ent. Soc., ii, 11, ♂.
730. Cordova, Mexico. Right antenna and right upper wing off.

transilis (Hemiteles), Proc. Acad. Nat. Sci., 1873, 175, ♀.
830. Orizaba, Mexico. Apical half of right antenna off.

transversus (Cryptus), Proc. Acad. Nat. Sci., 1873, 136, ♀.
753. Mirador, Mexico. Apical half of right antenna off.

triangularis (Mesoleptus), Trans. Am. Ent. Soc., ii, 101, ♂.
1409. Illinois. Both antennae off.

tricarinatus (Exochus), Trans. Am. Ent. Soc., ii, 38, ♂.
878. Cordova, Mexico. In good condition.

tricincta (Pimpla), Proc. Ent. Soc. Phil., iv, 37, ♀.
Cuba. In Gundlach Collection.

tricinctus (Trogus), Proc. Ent. Soc. Phil., iv, 19, ♀.
1636. Cuba. Both antennae broken. A ♀ in fine condition, in the Society's Collection, also from Cuba.

trifasciatus (Tryphon?) Proc. Ent. Soc. Phil., iii, 276, ♂.
1281. Pennsylvania. Right antenna off, also right anterior wing.

trogiformis (Ichneumon?), Proc. Ent. Soc. Phil., iii, 175, ♂.
1090. New Jersey. Tip of right antenna off.

truculentus (Ichneumon), Trans. Am. Ent. Soc., vi, 150, ♀.
1091. White Mountains, New Hampshire. In good condition.

tuberculifrons (Glypta), Trans. Am. Ent. Soc., iii, 152, ♀ ♂.
1467 ♀. Illinois. In good condition.

tumidifrons (Ichneumon), Trans. Am. Ent. Soc., i, 311, ♀.
1092. Illinois. In good condition.

turbatus (Cryptus), Proc. Acad. Nat. Sci., 1878, 363, ♀.
1164. California. Both antennae off.

tuxtla (Ichneumon), Trans. Am. Ent. Soc., ii, 17, ♀.
684. Cordova, Mexico. In good condition.

ultimus (Cryptus), Proc. Ent. Soc. Phil., iii, 305, ♀.
1165. Colorado. In good condition.

ultimus (Ichneumon), Trans. Am. Ent. Soc., vi, 178, ♀.
1093. White Mountains, New Hampshire. In good condition.

ultus (Ichneumon), Trans. Am. Ent. Soc., i, 295, ♂.
1311. West Virginia. In good condition.

uncinatus (Ichneumon), Trans. Am. Ent. Soc., vi, 159, ♀.
1094. Canada. In good condition.

unicolor (Mesoleptus), Proc. Ent. Soc. Phil., iii, 271.
1347. Pennsylvania. Apical half of right antenna off.

unicolor (Pezomachus), Can. Ent., iv, 64, ♀.
1215. Delaware. In good condition.

uniformis (Mesochorus), Trans. Am. Ent. Soc., iv, 171, ♀.
Texas. In Belfrage Collection; type No. 1590, U. S. N. M. "Condition good."

univittatus (Polycyrtus), Proc. Acad. Nat. Sci., 1873, 148, ♂ ♀.
774 ♀. Mexico. Right posterior leg except coxa, off.

utilis (Ichneumon), Trans. Am. Ent. Soc., i, 311, ♂.
1095. Massachusetts. In good condition.

uxorius (Ichneumon), Trans. Am. Ent. Soc., i, 310, ♀.
Cuba. In Gundlach Collection.

vafer (Ichneumon), Trans. Am. Ent. Soc., vi, 178, ♂.
1096. White Mountains, New Hampshire. In good condition.

valens (Mesoleptus), Proc. Ent. Soc. Phil., iv, 261, ♀.
1578. Colorado. In good condition.

validus (Exochus), Proc. Ent. Soc. Phil., iv, 18, ♂.
1314. Cuba. In good condition.

validus (Mesoleptus?), Proc. Ent. Soc. Phil., iii, 258, ♀ ♂.
1558 ♀. Pennsylvania. In good condition.

varia (Lampronota), Trans. Am. Ent. Soc., iii, 164, ♂.
1486. Canada. In good condition.

variegatus (Ichneumon), Proc. Ent. Soc. Phil., iii, 153, ♂.
1097. Colorado. In good condition.

varifrons (Tryphon), Trans. Am. Ent. Soc., ii, 104, ♂.
1360. Massachusetts. In good condition.

varipes (Glypta), Proc. Ent. Soc. Phil., iv, 267, ♀.
1444. Colorado. In good condition.

vecors (Ichneumon), Trans. Am. Ent. Soc., vi, 172, ♀.
See *ventralis* || Cress.

velox (Cryptus), Proc. Ent. Soc. Phil., iii, 293, ♀.
1166. New York. In good condition.

velox (Ichneumon), Proc. Ent. Soc. Phil., iii, 185, ♀.
1099. Illinois. In good condition.

ventralis (Arenetra), Trans. Am. Ent. Soc., iii, 160, ♂.
1473. New York, In good condition.

ventralis (Ichneumon), Proc. Ent. Soc. Phil., iv, 250, ♂.
1100. Colorado. In good condition.

ventralis (Ichneumon), Trans. Am. Ent. Soc., i, 308, ♀.
1098. Hudson Bay Territory. Thorax crushed in pinning; name preoccupied, renamed *vecors* Cress.

venustus (Arotes), Trans. Am. Ent. Soc., ii, 260, ♀ ♂.
1433 ♀. Massachusetts. In good condition.

venustus (Cteniscus), Proc. Ent. Soc. Phil., iv, 263, ♀.
1340. Colorado. In good condition.

verbosum (Anomalon), Proc. Acad. Nat. Sci., 1878, 368, ♂ ♀.
1549 ♂. California. Left antenna off.

versabilis (Ichneumon), Trans. Am. Ent. Soc., vi, 161, ♂.
1101. New York. In good condition.
vicinus (Arotes), Trans. Am. Ent. Soc., ii, 260, ♂.
1432. Massachusetts. In good condition.
vicinus (Ichneumon), Proc. Ent. Soc. Phil., iii, 169, ♀.
1102. Illinois. In good condition.
vicinus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 268, ♀.
1581. New Jersey. Both antennae off.
vicinus (Odontomerus), Trans. Am. Ent. Soc., iii, 168, ♂.
1525. Massachusetts. Right posterior tarsus off.
vicinus (Oedicephalus), Proc. Acad. Nat. Sci., 1873, 130, ♀.
737. Orizaba, Mexico. Left antenna off.
vincibilis (Ichneumon), Trans. Am. Ent. Soc., i, 312, ♀.
1312. Illinois. In good condition.
vinnulus (Ischnus), Proc. Ent. Soc. Phil., iii, 189, ♂.
1251. Pennsylvania. In good condition.
vinulentus (Ichneumon), Proc. Ent. Soc. Phil., iii, 162, ♂.
1103. Colorado. In good condition.
viola (Ichneumon), Proc. Ent. Soc. Phil., iii, 137, ♀.
1104. Pennsylvania. Posterior tarsi broken.
virescens (Ichneumon), Proc. Acad. Nat. Sci., 1873, 126, ♀.
713. Mirador, Mexico. In good condition.
virginicus (Ichneumon), Proc. Ent. Soc. Phil., iii, 181, ♀.
1105. Virginia. In good condition.
virginiensis (Glypta), Trans. Am. Ent. Soc., iii, 157, ♀.
1459. West Virginia. In good condition.
virginiensis (Pharsalia), Trans. Am. Ent. Soc., iv, 177, ♂.
1604. West Virginia. Right antenna and right hind tarsus broken; left anterior wing off.
vitalis (Ichneumon), Trans. Am. Ent. Soc., vi, 149, ♀.
1106. New York. Both antennae off, and right hind tarsus broken.
vittatipes (Exetastes), Proc. Acad. Nat. Sci., 1873, 389, ♀.
869. Cordova, Mexico. In good condition.
vitticolle (Anomalon), Proc. Acad. Nat. Sci., 1873, 377, ♀.
833. Orizaba, Mexico. In good condition.
vitticollis (Cteniscus), Trans. Em. Ent. Soc., ii, 113, ♂.
1335. Massachusetts. Head off.
vitticollis (Eiphosoma), Proc. Ent. Soc. Phil., iv, 53, ♀.
892. Cuba. Right posterior tarsus off.
vittifrons (Ichneumon), Proc. Ent. Soc. Phil., iii, 143, ♂.
1107. Delaware. In good condition.
vittifrons (Xorides), Can. Ent., i, 37, ♀.
1514. London, Ontario, Canada. Tips of antennae off.

vivax (Ichneumon), Trans. Am. Ent. Soc., vi, 178, ♀.
1108. White Mountains, New Hampshire. In good condition.
vivida (Lampronota), Proc. Acad. Nat. Sci., 1878, 378, ♂.
1500. Vancouver Island, British Columbia. In good condition.
vivum (Anomalon), Proc. Acad. Nat. Sci., 1878, 368, ♀.
Oregon. Not found.
volens (Ischnus), Proc. Ent. Soc. Phil., iii, 192, ♂.
1252. Virginia. Both antennae off.
volesus (Ichneumon), Trans. Am. Ent. Soc., i, 304, ♀.
1109. Massachusetts. In good condition.
vulgaris (Glypta), Trans. Am. Ent. Soc., iii, 154, ♂ ♀.
1450 ♀. Massachusetts. In good condition.
vulgaris (Phygadeuon), Proc. Ent. Soc. Phil., iii, 310, ♀.
1229. Illinois. In good condition.
vulgaris (Phytodietus), Trans. Am. Ent. Soc., iii, 166, ♀ ♂.
1506 ♀. Delaware. In good condition.
vultus (Ichneumon), Proc. Ent. Soc. Phil., iii, 165, ♂.
1110. Colorado. In good condition.
vultus (Mesoleptus), Proc. Ent. Soc. Phil., iii, 268, ♂.
1407. Delaware. Both antennae off.
w-album (Ischnus), Proc. Ent. Soc. Phil., iii, 191, ♂.
1253. Pennsylvania. In good condition.
wilsoni (Ischnus), Proc. Ent. Soc. Phil., iii, 188, ♂.
1254. Virginia. In good condition.
wiltii (Epimecis), Trans. Am. Ent. Soc., iii, 143, ♀.
1540. Ohio. Tip of right antenna off.
zacatecus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 116, ♀.
673. Orizaba, Mexico. In good condition.
zapoteca (Pimpla), Proc. Acad. Nat. Sci., 1873, 402, ♂ ♀.
613 ♀. Orizaba, Mexico. Tip of right antenna off.
zapotecus (Christolia), Proc. Acad. Nat. Sci., 1873, 164, ♀ ♂.
807 ♀. Orizaba, Mexico. In good condition.
zapotecus (Ichneumon), Trans. Am. Ent. Soc., ii, 3, ♀.
650. Cordova, Mexico. In good condition.
zapotecus (Phygadeuon), Proc. Acad. Nat. Sci., 1873, 140, ♂.
761. Orizaba, Mexico. In good condition.
zaptlanus (Ichneumon), Proc. Acad. Nat. Sci., 1873, 119, ♀.
687. Orizaba, Mexico. In good condition.
zebratus (Ichneumon), Trans. Am. Ent. Soc., i, 299, ♀.
1111. Illinois. In good condition.
zelotypus (Exetastes), Proc. Acad. Nat. Sci., 1878, 370, ♂ ♀.
1611 ♀. San Diego, California. In good condition.
zelotypus (Ichneumon), Trans. Am. Ent. Soc., i, 299, ♂.
1112. West Virginia. In good condition.

zonata (Pimpla), Proc. Acad. Nat. Sci., 1873, 401, ♀.
612. Orizaba, Mexico. In good condition.
zonatus (Mesostenus), Proc. Ent. Soc. Phil., iv, 28, ♀.
887. Cuba. In good condition.

STEPHANIDAE

brunneus (Megischus), Proc. Ent. Soc. Phil., iv, 84, ♀ ♂.
1647 ♀. Cuba. In good condition.
cinctipes (Stephanus), Proc. Ent. Sec. A. N. S., 1880, xviii, ♀.
1648. Washington Territory. Right upper wing off.
cubensis (Stenophasmus), Proc. Ent. Soc. Phil., iv, 86, ♀.
2785. Cuba. In good condition. Type specimen returned by Gundlach.
gundlachii (Stenophasmus), Proc. Ent. Soc. Phil., iv, 85, ♀.
Cuba. In Gundlach Collection.
megischoides (Stenophasmus), Proc. Ent. Soc. Phil., iv, 86, ♂.
Cuba. In Gundlach Collection.
pusillus (Stenophasmus), Proc. Ent. Soc. Phil., iv, 87, ♂.
Cuba. In Gundlach Collection.
texanus (Megischus), Trans. Am. Ent. Soc., iv, 190, ♀.
1649. Comal County, Texas. Tip of right antenna off; wings in poor condition.

BRACONIDAE

abdominale (Toxoneuron), Can. Ent., v, 68, ♂.
1712. Illinois. In good condition.
abdominalis (Aleiodes), Trans. Am. Ent. Soc., ii, 379, ♀.
1660. Pennsylvania. In good condition.
abdominalis (Ichneutes), Trans. Am. Ent. Soc., iv, 179, ♀.
Texas. In Belfrage Collection; type No. 1642, U. S. N. M. "Condition good."
aciculatus (Aleiodes), Trans. Am. Ent. Soc., ii, 381, ♀.
1669. Illinois. Tip of right antenna off.
aciculatus (Bracon), Proc. Ent. Soc. Phil., iv, 73, ♀.
Cuba. In Gundlach Collection.
aciculatus (Hormius?), Trans. Am. Ent. Soc., iv, 190, ♀.
Texas. In Belfrage Collection; type No. 1621, U. S. N. M. "Right antenna gone."
aethiops (Toxoneuron), Can. Ent., v, 67, ♀.
1708. Cordova, Mexico. In good condition.
agilis (Microctonus), Can. Ent., iv, 226, ♂.
1772. Illinois. In good condition.
agilis (Microdus), Can. Ent., v, 52, ♀.
1719. Massachusetts. In good condition.

albifrons (Bracon), Proc. Ent. Soc. Phil., iv, 79, ♂.
1679. Cuba. Tips of antennae off.
albitarsis (Agathis), Proc. Ent. Soc. Phil., iv, 63, ♀ ♂.
1729 ♂. Cuba. In good condition.
albitarsis (Helcon), Can. Ent., v, 83, ♂.
1757. Virginia. In good condition.
americanus (Eubadizon), Can. Ent., iv, 230, ♀.
1749. New Jersey. In good condition.
americanus (Helcon), Can. Ent., v, 84, ♀.
1758. Canada. In good condition.
analis (Alysia), Proc. Ent. Soc. Phil., iv, 88, ♂.
Cuba. In Gundlach Collection.
annulipes (Microdus), Can. Ent., v, 53, ♀.
1716. Massachusetts. In good condition.
apicale (Toxoneuron), Can. Ent., v, 68, ♂.
1707. Illinois. Tips of antennae broken.
armatus (Bracon), Proc. Ent. Soc. Phil., iv, 74, ♀.
Cuba. In Gundlach Collection.
atriceps (Aleiodes), Trans. Am. Ent. Soc., ii, 380, ♀.
1662. Mexico. In good condition.
atricornis (Rogas), Trans. Am. Ent. Soc., iv, 188, ♀.
1672. Texas. In good condition.
atripes (Agathis), Proc. Ent. Soc. Phil., iv, 296, ♂.
1731. Colorado. In good condition.
atriventris (Exothecus), Trans. Am. Ent. Soc., iv, 189, ♀.
2744. Texas. Right antenna off beyond joint six.
belfragei (Bracon), Trans. Am. Ent. Soc., iv, 186, ♀.
Texas. In Belfrage Collection; type No. 1610, U. S. N. M. "Condition good."
bicolor (Ichneutes), Can. Ent., iv, 230, ♀.
1695. Massachusetts. Most of right antenna off.
bicolor (Rhitigaster), Proc. Ent. Sec. A. N. S., 1880, xvii, ♂ ♀.
1746 ♀. Pennsylvania. Apical half of left antenna off.
borealis (Helcon), Can. Ent., v, 83, ♂.
1756. Maine. In good condition.
brunneiventris (Opius), Trans. Am. Ent. Soc., iv, 178, ♂.
Texas. In Belfrage Collection; type No. 1646, U. S. N. M. "Condition good."
burrus (Aleiodes), Trans. Am. Ent. Soc., ii, 381, ♀.
1670. Illinois. In good condition.
calcaratus (Microdus), Can. Ent., v, 51, ♀.
1724. Delaware. In good condition.
californicus (Proterops), Can. Ent., v, 69, ♂.
1697. California. In good condition.

canadensis (Aleiodes), Trans. Am. Ent. Soc., ii, 380, ♀.
1667. Canada. Right hind wing off.
cautus (Chelonus), Trans. Am. Ent. Soc., iv, 180, ♀.
2737. Texas. In good condition.
centralis (Bracon), Proc. Ent. Soc. Phil., iv, 82, ♀.
Cuba. In Gundlach Collection.
cincticornis (Bracon?), Proc. Ent. Soc. Phil., iv, 81, ♀.
Cuba. In Gundlach Collection.
cinctus (Microdus), Can. Ent., v, 53, ♂ ♀.
1718 ♂. Illinois. In good condition.
communis (Perilitus), Can. Ent., iv, 82, ♂ ♀.
1768 ♀. Connecticut. Both right wings off.
connectens (Chelonus), Trans. Am. Ent. Soc., iv, 180, ♀.
Texas. In Belfrage Collection; type No. 1629, U. S. N. M. "Condition good."
crenulatus (Bracon), Proc. Ent. Soc. Phil., iv, 70, ♀.
1694. Cuba. Tips of antennae off.
croceipes (Microgaster), Trans. Am. Ent. Soc., iv, 183, ♂ ♀.
1701 ♀. Texas. In good condition.
croceiventris (Bracon), Proc. Ent. Soc. Phil., iv, 301, ♂.
2735. Colorado. In good condition.
croceus (Bracon), Proc. Ent. Soc. Phil., iv, 302, ♀.
1682. Colorado. In good condition.
cubensis (Agathis), Proc. Ent. Soc. Phil., iv, 62, ♀ ♂.
1735 ♀. Cuba. In good condition.
dejectus (Bracon), Proc. Ent. Soc. Phil., iv, 79, ♂.
Cuba. In Gundlach Collection.
delicatus (Macrocentrus), Trans. Am. Ent. Soc., iv, 178, ♂ ♀.
1765 ♀. Texas. In good condition.
delicatus (Rogas), Trans. Am. Ent. Soc., iv, 189, ♂.
1653. Texas. Both antennae broken.
dimidiatus (Perilitus), Can. Ent., iv, 83, ♂ ♀.
1770 ♀. New Jersey. In good condition.
discoideus (Aleiodes), Trans. Am. Ent. Soc., ii, 380, ♀.
1654. Illinois. Tips of antennae off.
discolor (Bracon), Proc. Ent. Soc. Phil., iv, 80, ♀.
1652. Cuba. Antennae broken; wings in poor condition.
discolor (Microdus), Can. Ent., v, 52, ♂ ♀.
1715 ♀. Illinois. In good condition.
disjunctus (Bracon), Trans. Am. Ent. Soc., iv, 186, ♀.
Texas. Belfrage Collection. "Not found."
disputabilis (Bracon), Proc. Ent. Soc. Phil., iv, 300, ♀.
1683. Colorado. Apical half of right antenna off.
dissitus (Bracon), Proc. Ent. Soc. Phil., iv, 300, ♀.
2736. Colorado. Right antenna off beyond joint two.

distinctus (Bracon), Proc. Ent. Soc. Phil., iv, 75, ♀.
Cuba. In Gundlach Collection.

divisus (Microdus), Can. Ent., v, 52, ♂.
1726. Illinois. In good condition.

earinoides (Microdus), Can. Ent., v, 54, ♀.
1714. Massachusetts. In good condition.

electus (Chelonus), Trans. Am. Ent. Soc., iv, 180, ♂ ♀.
Texas. In Belfrage Collection; type No. 1630, U. S. N. M. "Right antenna gone."

epicus (Bracon), Trans. Am. Ent. Soc., iv, 183, ♀.
1677. Texas. In good condition.

exiguus (Bracon), Proc. Ent. Soc. Phil., iv, 81, ♀.
1688. Cuba. In poor condition; the right wings and abdomen detached, and both posterior wings and right hind leg except coxa off.

exoratus (Agathis), Trans. Am. Ent. Soc., iv, 182, ♂.
1734. Texas. In good condition.

fascipennis (Aleiodes), Trans. Am. Ent. Soc., iii, 378, ♀.
1665. Mexico. In good condition.

fascipennis (Microdus), Proc. Ent. Soc. Phil., iv, 64, ♀.
2667. Cuba. Tips of both antennae, and posterior legs beyond coxae, off.

faustus (Bracon), Trans. Am. Ent. Soc., iv, 185, ♀.
1674. Texas. In good condition.

femoratus (Aleiodes), Trans. Am. Ent. Soc., ii, 382, ♀.
1635. West Virginia. In good condition.

ferrugator (Agathis), Proc. Ent. Soc. Phil., iv, 62, ♀ ♂.
Cuba. In Gundlach Collection.

flavidus (Rogas), Proc. Ent. Soc. Phil., iv, 83, ♂.
1663. Cuba. Left posterior tarsus off.

flaviventris (Microgaster), Proc. Ent. Soc. Phil., iv, 66, ♀.
1703. Cuba. Tips of both antennae off.

frigidus (Helcon), Can. Ent., v, 84, ♀.
1755. Hudson Bay Territory. In good condition.

fulvescens (Microdus), Proc. Ent. Soc. Phil., iv, 297, ♀.
1727. Colorado. In good condition.

fulvipes (Helcon), Proc. Ent. Soc. Phil., iv, 292, ♀.
1760. Colorado. In poor condition; right antenna and tips of wings broken, and left hind leg beyond coxa off.

fulvipes (Ichneutes), Can. Ent., iv, 231, ♂.
1696. Illinois. In good condition.

fulvus (Aleiodes), Trans. Am. Ent. Soc., ii, 381, ♀ ♂.
2122 ♂. Canada. In good condition.

fulvus (Aphidius?), Proc. Ent. Soc. Phil., iv, 90.
Cuba. In Gundlach Collection.

fumipennis (Aleiodes), Trans. Am. Ent. Soc., ii, 378, ♀.
1656. Illinois. In good condition.
fuscatus (Trioxys), Proc. Ent. Soc. Phil., iv, 89.
1771. Cuba. Left antenna off.
fusciceps (Aleiodes), Trans. Am. Ent. Soc., ii, 382, ♀.
1673. Mexico. Left antenna and tip of right off, also left anterior wing missing.
fuscovarius (Bracon), Proc. Ent. Soc. Phil., iv, 83, ♀.
Cuba. In Gundlach Collection.
fuscoventris (Aphidius), Proc. Ent. Soc. Phil., iv, 89.
Cuba. In Gundlach Collection.
graphicus (Rogas), Trans. Am. Ent. Soc., iv, 188, ♂.
2749. Texas. Tip of left antenna off.
humilis (Perilitus), Can. Ent., iv, 84, ♀.
2669. Illinois. In good condition.
hyalinus (Microgaster), Proc. Ent. Soc. Phil., iv, 68, ♀.
1698. Cuba. Both antennae broken off near base.
imitatus (Microdus), Can. Ent., v, 51, ♀.
1721. Massachusetts. In good condition.
insularis (Chelonus), Proc. Ent. Soc. Phil., iv, 61.
1745. Cuba. Tip of left antenna off.
intermedius (Aleiodes), Trans. Am. Ent. Soc., ii, 380, ♂ ♀.
1668 ♀. Massachusetts. In good condition.
intermedius (Perilitus), Can. Ent., iv, 82, ♂.
2670. Massachusetts. Left hind wing off.
intimus (Bracon), Proc. Ent. Soc. Phil., iv, 78, ♀ ♂.
1693 ♀. Cuba. Tip of left antenna off.
iridescens (Chelonus), Proc. Ent. Soc. Phil., iv, 294, ♂.
1742. Colorado. In good condition.
iridescens (Microgaster), Proc. Ent. Soc. Phil., iv, 68, ♂ ♀.
1704 ♂. Cuba. In good condition.
laeviceps (Dacnusa), Trans. Am. Ent. Soc., iv, 191, ♀.
Texas. In Belfrage Collection; type No. 1647, U. S. N. M. "Apex of left antenna gone."
laevifrons (Chelonus), Proc. Ent. Soc. Phil., iv, 294, ♂.
2738. Colorado. In good condition.
laevis (Leiophron), Can. Ent., iv, 228, ♂.
1753. Canada. In good condition.
laeviventris (Ischius), Trans. Am. Ent. Soc., iv, 182, ♂.
Texas. Not found. A specimen in the Belfrage Collection marked, "type No. 1640," U. S. N. M., with the "head wanting."
lateralis (Eubadizon), Can. Ent., iv, 229, ♂.
2742. Illinois. Tip of right antenna off.
laticinctus (Chelonus), Trans. Am. Ent. Soc., iv, 180, ♀.
2739. Texas. In good condition.

laticinctus (Microdus), Can. Ent., v. 53, ♂.
1717. Missouri. In good condition.
lativentris (Bracon), Proc. Ent. Soc. Phil., iv, 70, ♀.
1691. Cuba. In good condition.
lectus (Aleiodes), Trans. Am. Ent. Soc., ii, 379, ♂.
1661. Illinois. Both antennae broken.
limatus (Bracon), Proc. Ent. Soc. Phil., iv, 75, ♀.
1650. Cuba. Apical two-thirds of left antenna off.
longicornis (Aphidius), Proc. Ent. Soc. Phil., iv, 90.
Cuba. In Gundlach Collection.
longipalpus (Microdus?), Proc. Ent. Soc. Phil., iv, 299, ♀.
2745. Colorado. In good condition.
lycti (Anisopelma), Amer. Entom., iii, 24, ♂ ♀.
2052 ♀. Pennsylvania. Right anterior leg off.
maculipennis (Microgaster), Trans. Am. Ent. Soc., iv, 183, ♂ ♀.
1699 ♀. Texas. Tip of left antenna off.
maculiventris (Eubadizon), Trans. Am. Ent. Soc., iv, 178, ♂.
2743. Comal County, Texas. Tip of left antenna off.
magdali (Calyptus), Psyche, ii, 189, ♂ ♀.
1750 ♀. Massachusetts. In good condition.
major (Calyptus), Can. Ent., iv, 228, ♀.
1751. Virginia. In good condition.
mandibularis (Rogas), Trans. Am. Ent. Soc., iv, 188, ♂.
Texas. Belfrage Collection. Not found.
marginiventris (Microgaster), Proc. Ent. Soc. Phil., iv, 67, ♂ ♀.
1705 ♂. Cuba. In good condition.
mavoritus (Bracon), Trans. Am. Ent. Soc., iv, 186, ♀.
1678. Texas. In good condition.
meabilis (Agathis), Trans. Am. Ent. Soc., iv, 183, ♂ ♀.
1739 ♀. Texas. In good condition.
media (Agathis), Proc. Ent. Soc. Phil., iv, 295, ♂.
1733. Colorado. In good condition.
mediatus (Microgaster), Proc. Ent. Soc. Phil., iv, 66, ♂.
1700. Cuba. In good condition.
medius (Microdus), Proc. Ent. Soc. Phil., iv, 298, ♂.
1725. Colorado. Tip of left antenna off.
melleus (Aleiodes), Trans. Am. Ent. Soc., ii, 382, ♂.
2672. Massachusetts. Right antenna off beyond joint two.
melleus (Phylax), Trans. Am. Ent. Soc., iv, 178, ♀.
1763. Texas. In good condition.
mellipes (Euphorus), Can. Ent., iv, 227, ♂.
1773. New Jersey. In good condition.
mexicanum (Toxoneuron), Can. Ent., v, 67, ♂ ♀.
1706 ♀. Cordova, Mexico. Tips of antennae off.

mexicanus (Aleiodes), Trans. Am. Ent. Soc., ii, 378, ♂.
1658. Mexico. In good condition.
mexicanus (Calyptus), Can. Ent., iv, 229, ♂.
1752. Orizaba, Mexico. In good condition.
minima (Anisopelma), Amer. Entom., iii, 24, ♀.
2731. New York. Both antennae off.
minima (Dacnusa), Trans. Am. Ent. Soc., iv, 191, ♂.
2741. Texas. Left upper wing, and both posterior legs off.
minimus (Bracon), Trans. Am. Ent. Soc., iv, 187, ♂ ♀.
Texas. In Belfrage Collection; type ♀ No. 1613, U. S. N. M. "Condition good. Male not found."
minimus (Chelonus), Trans. Am. Ent. Soc., iv, 181, ♀.
2740. Texas. In good condition.
minutum (Toxoneuron), Can. Ent., v, 67, ♀.
1709. Illinois. In good condition.
molestus (Rogas), Trans. Am. Ent. Soc., iv, 188, ♀.
Texas. In Belfrage Collection; type No. 1625, U. S. N. M. "Antennae gone, except right scape and pedicel."
montivagus (Bracon), Proc. Ent. Soc. Phil., iv, 299, ♀ ♂.
1685 ♀. Colorado. In good condition.
nigriceps (Alysia), Proc. Ent. Soc. Phil., iv, 87, ♂.
Cuba. In Gundlach Collection.
nigriceps (Microdus), Trans. Am. Ent. Soc., iv, 182, ♂.
Texas. In Belfrage Collection; type No. 1637, U. S. N. M. "Right antenna wanting beyond second joint."
nigripes (Agathis), Proc. Ent. Soc. Phil., iv, 297, ♀.
1732. Colorado. In good condition.
niveitarsus (Perilitus), Can. Ent., iv, 81, ♂ ♀.
1766 ♀. Massachusetts. In good condition.
novitus (Bracon), Trans. Am. Ent. Soc., iv, 186, ♂.
Texas. In Belfrage Collection; type No. 1614, U. S. N. M. "Antennae wanting beyond middle."
nuperus (Bracon), Trans. Am. Ent. Soc., iv, 187, ♀.
1686. Texas. In good condition.
nuperus (Macrocentrus), Trans. Am. Ent. Soc., iv, 178, ♀.
1764. Texas. In good condition.
occidentalis (Helcon), Proc. Ent. Soc. Phil., iv, 292, ♂.
1754. Colorado. In good condition.
orbitalis (Bracon), Trans. Am. Ent. Soc., iv, 184, ♂ ♀.
1675 ♀. Texas. In good condition.
orizabae (Toxoneuron), Can. Ent., v, 67, ♂.
1710. Orizaba, Mexico. In good condition.
ornatus (Aleiodes), Trans. Am. Ent. Soc., ii, 380, ♀.
1666. Mexico. Head off.

pallens (Bracon), Proc. Ent. Soc. Phil., iv, 81, ♀.
Cuba. In Gundlach Collection.
pallens (Microdus), Can. Ent., v, 53, ♀.
2746. Illinois. Tips of both antennae off.
pallida (Chaonia), Proc. Ent. Soc. Phil., iv, 61, ♂.
Cuba. In Gundlach Collection.
pallipes (Aphidius?), Proc. Ent. Soc. Phil., iv, 90.
Cuba. In Gundlach Collection.
pallitarsus (Perilitus), Can. Ent., iv, 81, ♂.
1767. New Jersey. In good condition.
palliventris (Bracon), Proc. Ent. Soc. Phil., iv, 301, ♀.
1676. Colorado. Tip of right antenna off; right upper wing detached.
pedalis (Aleiodes), Trans. Am. Ent. Soc., ii, 379, ♀.
1664. Mexico. Tip of left antenna off.
pedalis (Helcon), Can. Ent., v, 85, ♂ ♀.
1759 ♀. Massachusetts. In good condition.
perparvus (Bracon), Proc. Ent. Soc. Phil., iv, 82, ♂.
Cuba. In Gundlach Collection.
piceus (Trioxys), Rep. Ent. U. S. Dept. Agric., 1879, 260, ♂ ♀.
Norfolk, Virginia. Type No. 1650, with U. S. Dept. of Agriculture.
picipes (Bracon), Proc. Ent. Soc. Phil., iv, 73, ♀.
1690. Cuba. Tips of both antennae off.
pilosus (Rogas), Trans. Am. Ent. Soc., iv, 189, ♀.
1657. Texas. In good condition.
pinos (Microgaster), Proc. Ent. Soc. Phil., iv, 67, ♀.
1702. Isle of Pines, Cuba. Left antenna broken.
pleuralis (Eubadizon), Can. Ent., iv, 230, ♂ ♀.
1748 ♀. Missouri. In good condition.
plicatus (Bracon), Proc. Ent. Soc. Phil., iv, 72, ♀.
Cuba. In Gundlach Collection.
poeyi (Rhopalosoma), Proc. Ent. Soc. Phil., iv, 58, 59, fig. 6, ♂ ♀.
1775 ♀. Cuba. Tips of antennae, and right posterior tibia and tarsus, off. A perfect ♀ specimen in Society's Collection, from North Carolina.
proximus (Perilitus), Can. Ent., iv, 83, ♂.
2748. Illinois. In good condition.
pygmaeus (Microdus), Trans. Am. Ent. Soc., iv, 182, ♀ ♂.
2747 ♂. Texas. Right wings crumpled.
radiatus (Bracon), Trans. Am. Ent. Soc., iv, 185, ♀.
1651. Texas. In good condition.
regnatrix (Bracon), Proc. Ent. Soc. Phil., iv, 69, ♂ ♀.
1689 ♀. Cuba. In good condition.
rileyi (Aleiodes), Trans. Am. Ent. Soc., ii, 382, ♀.
1671. Missouri. Both antennae more or less broken.

rotundiceps (Calyptus), Can. Ent., iv, 228, ♂.
2733. Illinois. Both posterior tarsi off.
rubripes (Agathis), Trans. Am. Ent. Soc., iv, 183, ♀.
1730. Texas. In good condition.
ruficoxalis (Alysia), Proc. Ent. Soc. Phil., iv, 88, ♂.
Cuba. In Gundlach Collection.
rufithorax (Bracon), Proc. Ent. Soc. Phil., iv, 80, ♀.
Cuba. In Gundlach Collection.
rufiventris (Chelonus), Proc. Ent. Soc. Phil., iv, 293, ♂.
1744. Colorado. In good condition.
rugiceps (Bracon), Trans. Am. Ent. Soc., iv, 184, ♀.
Texas. Belfrage Collection. "Not found."
rugulosus (Exothecus), Trans. Am. Ent. Soc., iv, 190, ♀.
Texas. In Belfrage Collection; type No. 1620, U. S. N. M. "Apices of antennae gone."
scitulus (Euphorus), Can. Ent., iv, 227, ♀.
1774. Illinois. In good condition.
sculptus (Euphorus), Can. Ent., iv, 227, ♀.
1762. Illinois. Tip of right antenna, right anterior and left posterior legs, wanting.
seminiger (Agathis), Proc. Ent. Soc. Phil., iv, 63, ♀.
Cuba. In Gundlach Collection.
seminiger (Tenthredoides), Proc. Ent. Soc. Phil., iv, 291, ♀ ♂.
1713 ♀. Colorado. In good condition.
simillimus (Microdus), Can. Ent., v, 51, ♂ ♀.
1722 ♂. Pennsylvania. In good condition.
simplex (Bracon), Trans. Am. Ent. Soc., iv, 184, ♀.
1684. Comal County, Texas. Tip of left antenna off.
stigmaterus (Microdus), Proc. Ent. Soc. Phil., iv, 65, ♀ ♂.
1738 ♀. Cuba. In poor condition, the head being badly eaten, leaving only one antenna entire; left upper wing off, also right posterior leg.
striatulus (Bracon), Proc. Ent. Soc. Phil., iv, 77, ♀.
Cuba. In Gundlach Collection.
terminalis (Aleiodes), Trans. Am. Ent. Soc., ii, 379, ♂ ♀.
1659 ♀. Delaware. In good condition.
terminatus (Microdus), Proc. Ent. Soc. Phil., iv, 298, ♂.
1720. Colorado. In good condition.
testaceipes (Trioxys), Rep. Ent. Dept., Agric., 1879, 208; Hubbard, Orange Ins. pl. 13, fig. 3, ♀.
Florida. Type No. 1649, with U. S. Dept. Agriculture.
texanus (Aleiodes), Trans. Am. Ent. Soc., ii, 378, ♀.
1655. Texas. In good condition.
texanus (Bracon), Trans. Am. Ent. Soc., iv, 187, ♀.
1681. Texas. In good condition.

texanus (Chelonus), Trans. Am. Ent. Soc., iv, 179, ♀.
1743. Texas. In good condition.
texanus (Helcon), Trans. Am. Ent. Soc., iv, 179, ♀.
Texas. In Belfrage Collection; type No. 1673, U. S. N. M. "Antennae broken at about middle, left nearer base."
texanus (Microdus), Trans. Am. Ent. Soc., iv, 181, ♂.
1723. Texas. Apical half of right antenna off.
texanus (Sigalphus), Trans. Am. Ent. Soc., iv, 179, ♀.
1747. Texas. In good condition.
thoracicum (Toxoneuron), Can. Ent., v, 68, ♂ ♀.
1711 ♀. Cordova, Mexico. Both antennae off.
thoracicus (Microdus), Trans. Am. Ent. Soc., iv, 181, ♂ ♀.
1728 ♀. Texas. In good condition.
tibiator (Calyptus), Can. Ent., iv, 229, ♂.
2734. New Jersey. Tips of both antennae off.
uniformis (Bracon), Proc. Ent. Soc. Phil., iv, 302, ♀.
1680. Colorado. Right antenna off.
utilis (Anisopelma), Am. Ent., iii, 24, ♂ ♀.
2732 ♀. New York. In good condition.
varipes (Microdus), Proc. Ent. Soc. Phil., iv, 65, ♀ ♂.
1737 ♂. Cuba. Left posterior leg off beyond coxa. Female in the Gundlach Collection.
ventralis (Bracon), Proc. Ent. Soc. Phil., iv, 76, ♀.
Cuba. In Gundlach Collection.
verticalis (Microdus), Trans. Am. Ent. Soc., iv, 182, ♀.
Texas. Belfrage Collection. "Not found."
voraginis (Bracon), Proc. Ent. Soc. Phil., iv, 71, ♀.
1692. Cuba. In good condition.
vulgaris (Agathis), Proc. Ent. Soc. Phil., iv, 295, ♀.
1740. Colorado. In good condition.
vulgaris (Perilitus), Can. Ent., iv, 83, ♂.
1769. Illinois. In good condition.
xanthostigma (Bracon), Proc. Ent. Soc. Phil., iv, 303, ♀.
1687. Colorado. In good condition.
xanthostigma (Chaonia), Proc. Ent. Soc. Phil., iv, 60, ♀ ♂.
Cuba. In Gundlach Collection.

CHALCIDIDAE

ambigua (Smicra), Trans. Am. Ent. Soc., iv, 44, ♂.
1807. Mexico. Right antenna off.
apicalis (Leucospis), Trans. Am. Ent. Soc., iv, 30, ♀.
1797. Mexico. In good condition.

arcana (Smicra), Trans. Am. Ent. Soc., iv, 44, ♂.
1786. Delaware. In good condition.
azteca (Leucospis), Trans. Am. Ent. Soc., iv, 33, ♀.
1799. Mexico. In good condition.
azteca (Smicra), Trans. Am. Ent. Soc., iv, 51, ♂.
1820. Mexico. In good condition.
barbara (Smicra), Trans. Am. Ent. Soc., iv, 47, ♂.
1790. Texas. In good condition.
bioculata (Smicra), Trans. Am. Ent. Soc., iv, 43, ♂.
1784. Texas. In good condition.
bulbiventris (Leucospis), Trans. Am. Ent. Soc., iv, 29, ♂.
1796. Mexico. Both antennae off; head had been detached and badly glued on; legs more or less broken.
canadensis (Smicra), Trans. Am. Ent. Soc., iv, 39, ♂.
1783. Canada. In good condition.
castaneus (Epitranus), Proc. Ent. Soc. Phil., iv, 100.
1823. Cuba. In good condition.
coaequalis (Smicra), Trans. Am. Ent. Soc., iv, 46, ♂.
1788. Delaware. In good condition. Described as a variety of *bracata* Sanborn.
coccinata (Smicra), Trans. Am. Ent. Soc., iv, 48, ♂.
1809. Mexico. Right antenna off beyond third joint.
coccinea (Smiera), Proc. Ent. Soc. Phil., iv, 91.
Cuba. In Gundlach Collection.
coloradensis (Chalcis), Trans. Am. Ent. Soc., iv, 60, ♂.
1826. Colorado. In good condition.
compactilis (Smicra), Trans. Am. Ent. Soc., iv, 50, ♀.
1818. Mexico. Both antennae off.
coxalis (Smicra), Trans. Am. Ent. Soc., iv, 45, ♂.
1787. Delaware. Apical half of right antenna off.
delicata (Smicra), Trans. Am. Ent. Soc., iv, 54, ♀.
1794. Texas. Left antenna off.
delira (Smicra), Trans. Am. Ent. Soc., iv, 41, ♂.
Texas. In Belfrage Collection; type No. 1655, U. S. N. M. "Condition good."
delumbis (Smicra), Trans. Am. Ent. Soc., iv, 40, ♂ ♀.
1781 ♀. Massachusetts. In good condition.
dorsata (Smicra), Trans. Am. Ent. Soc., iv, 49, ♀.
1791. Texas. In good condition.
dubiosa (Leucospis), Trans. Am. Ent. Soc., iv, 34, ♀.
1800. Mexico. Right antenna off.
encausta (Smicra), Trans. Am. Ent. Soc., iv, 46, ♂.
1789. Colorado. Both antennae off.
eubule (Smiera), Proc. Ent. Soc. Phil., iv, 93.
1814. Cuba. In good condition.

exornata (Smicra), Trans. Am. Ent. Soc., iv, 50, ♂.
1817. Mexico. In good condition.
faceta (Smicra), Trans. Am. Ent. Soc., iv, 43, ♂.
Texas. Not found. A specimen in the Belfrage Collection, marked "Type No. 1653, U. S. N. M., condition good." Described as a variety of *bioculata* Cress.
flammeola (Smicra), Trans. Am. Ent. Soc., iv, 48, ♂ ♀.
1811 ♂. Mexico. Left antenna off.
flavopicta (Smiera), Proc. Ent. Soc., Phil., iv, 99.
1810. Cuba. In good condition.
flebilis (Smicra), Trans. Am. Ent. Soc., iv, 39, ♂.
1778. Massachusetts. Both antennae off beyond second joint.
floridana (Leucospis), Trans. Am. Ent. Soc., iv, 33, ♂ ♀.
1777 ♀. Florida. In good condition. Described as a variety of *affinis* Say.
gundlachii (Smiera), Proc. Ent. Soc. Phil., iv, 93.
Cuba. In Gundlach Collection.
ignea (Smiera), Proc. Ent. Soc. Phil., iv, 92.
1812. Cuba. In good condition.
immaculata (Smiera), Proc. Ent. Soc. Phil., iv, 97.
1795. Cuba. In good condition.
incerta (Chalcis), Proc. Ent. Soc. Phil., iv, 101.
1824. Cuba. In good condition.
insularis (Phasgonophora), Proc. Ent. Soc. Phil., iv, 102, ♀ ♂.
1828 ♀. Cuba. In good condition.
intermedia (Smiera), Proc. Ent. Soc. Phil., iv, 92.
Cuba. In Gundlach Collection.
juxta (Smicra), Trans. Am. Ent. Soc., iv, 54, ♀.
1808. Mexico. Left anterior wing and left posterior leg, off.
lauta (Smicra), Trans. Am. Ent. Soc., iv, 45, ♀.
1806. Mexico. In good condition.
lecta (Smicra), Trans. Am. Ent. Soc., iv, 44, ♂ ♀.
1805 ♂. Mexico. In good condition.
lenta (Smicra), Trans. Am. Ent. Soc., iv, 52, ♂.
1821. Mexico. In good condition.
mendica (Smicra), Trans. Am. Ent. Soc., iv, 41, ♂.
1802. Mexico. Both antennae off.
mexicana (Smicra), Trans. Am. Ent. Soc., iv, 42, ♀ ♂.
1804 ♀. Mexico. In good condition.
mirabilis (Smicra), Trans. Am. Ent. Soc., iv, 53, ♂.
1792. Texas. In good condition.
miranda (Smicra), Trans. Am. Ent. Soc., iv, 49, ♂.
1813. Mexico. In good condition.
montezuma (Smicra), Trans. Am. Ent. Soc., iv, 51, ♂.
1819. Mexico. Both antennae off.

nigropicta (Smiera), Proc. Ent. Soc. Phil., iv, 95, ♀ ♂.
1816 ♀. Cuba. In good condition.
nortonii (Smicra) Trans. Am. Ent. Soc., iv, 45, ♂.
District of Columbia. (Norton Collection.) Type probably lost.
palens (Smiera), Proc. Ent. Soc. Phil., iv, 96.
1793. Cuba. In good condition.
pedalis (Chalcis), Trans. Am. Ent. Soc., iv, 60, ♀.
Texas. In Belfrage Collection; type No. 1660, U. S. N. M. "Condition good."
petiolata (Smiera), Proc. Ent. Soc., Phil., iv, 97.
Cuba. In Gundlach Collection.
pulchra (Smiera), Proc. Ent. Soc. Phil., iv, 94.
1815. Cuba. In good condition.
robusta (Chalcis), Proc. Ent. Soc. Phil., iv, 101.
1827. Cuba. In good condition.
rufofemorata (Smicra), Trans. Am. Ent. Soc., iv, 39, ♂.
1779. Texas. Flagellum of right antenna off.
sanguiniventris (Smicra), Trans. Am. Ent. Soc., iv, 43, ♀.
Texas. In Belfrage Collection; type No. 1658, U. S. N. M. "Condition good."
scutellaris (Smiera), Proc. Ent. Soc. Phil., iv, 98.
Cuba. In Gundlach Collection.
subobsoleta (Smicra), Trans. Am. Ent. Soc., iv, 42, ♂.
Texas. In Belfrage Collection; type No. 1436, U. S. N. M. "Condition good."
sumichrastii (Leucospis), Trans. Am. Ent. Soc., iv, 31, ♀.
1798. Mexico. Right upper wing off.
tegularis (Chalcis), Trans. Am. Ent. Soc., iv, 60, ♀.
1825. Texas. In good condition.
texana (Leucospis), Trans. Am. Ent. Soc., iv, 31, ♂.
1776. Texas. Both antennae off beyond third joint.
tolteca (Leucospis), Trans. Am. Ent. Soc., iv, 34, ♀ ♂.
1801 ♀. Mexico. In good condition.
tolteca (Smicra), Trans. Am. Ent. Soc., iv, 53, ♀.
1822. Mexico. In good condition.
toluca (Smicra), Trans. Am. Ent. Soc., iv, 42, ♀.
1803. Mexico. In good condition.
torvina (Smicra), Trans. Am. Ent. Soc., iv, 40, ♀.
1780. Texas. In good condition.
zabriskii (Diomorus), Psyche, ii, 189, ♀.
New Baltimore, New York (Greene County). Not found; probably in the Zabriskie Collection.

PROCTOTRUPIDAE

alatus (Gonatopus?), Trans. Am. Ent. Soc., iv, 193, ♀.
2671. Texas. Tip of left antenna off.
analis (Epyris), Trans. Am. Ent. Soc., iv, 193, ♀.
Texas. In Belfrage Collection; type No. 1662, U. S. N. M. "Condition good."
atriventris (Dryinus), Trans. Am. Ent. Soc., iv, 193, ♀.
Texas. Belfrage Collection. "Not found."
laeviventris (Epyris), Trans. Am. Ent. Soc., iv, 193, ♂.
1829. Texas. Left antenna off.

CHRYSIDIDAE

americana (Cleptes), Proc. Ent. Sec. A. N. S., 1879, x, ♂ ♀.
1831 ♀. Nevada. In good condition.
bella (Chrysis), Proc. Ent. Soc. Phil., iv, 312, ♀.
2683. Colorado. Right antenna except scape, and right posterior tarsus, off.
clara (Chrysis), Proc. Ent. Soc. Phil., iv, 313, ♀.
1844. Colorado. Tips of antennae off.
compacta (Holopyga), Proc. Ent. Soc. Phil., iv, 304.
1838. Colorado. In good condition.
consimilis (Chrysis), Proc. Ent. Soc. Phil., iv, 110, ♀.
1847. Cuba. Both antennae broken.
cupricolle (Hedychrum), Proc. Ent. Soc. Phil., iv, 305.
1833. Colorado. In good condition.
cyaniventre (Hedychrum), Proc. Ent. Soc. Phil., iv, 104, ♂.
1836. Cuba. In good condition.
densa (Chrysis), Proc. Ent. Soc. Phil., iv, 307, ♀.
1850. Colorado. In good condition.
divergens (Chrysis), Proc. Ent. Soc. Phil., iv, 105, ♀.
Cuba. In Gundlach Collection.
dubia (Chrysis), Proc. Ent. Soc. Phil., iv, 108, ♀.
1845. Cuba. In good condition. The type specimen was returned by Gundlach.
edwardsii (Euchroeus), Proc. Ent. Sec. A. N. S., 1879, iv.
1848. California. In good condition.
integra (Chrysis), Proc. Ent. Soc. Phil., iv, 306, ♀.
1852. Colorado. In good condition. Name preoccupied; renamed *tota* Aaron.
laeviventris (Omalus), Proc. Ent. Soc. Phil., iv, 303.
1832. Colorado. In good condition.

lauta (Chrysis), Proc. Ent. Soc. Phil., iv, 310, ♀.
1839. Colorado. In good condition.
oblonga (Chrysis), Proc. Ent. Soc. Phil., iv, 106, ♀.
2787. Cuba. In fair condition; inside more or less eaten.
perpulchra (Chrysis), Proc. Ent. Soc. Phil., iv, 308, ♀.
1849. Colorado. In good condition.
prasinus (Chrysis), Proc. Ent. Soc. Phil., iv, 310, ♀.
1841. Colorado. In good condition.
pulcherrima (Chrysis), Proc. Ent. Soc. Phil., iv, 311, ♂.
1840. Colorado. In good condition.
purpurata (Cleptes), Proc. Ent. Sec. A. N. S., 1879, x, ♀.
1830. Vancouver Island, British Columbia. In good condition.
purpuriventris (Chrysis), Proc. Ent. Soc. Phil., iv, 107, ♂.
Cuba. In Gundlach Collection.
scitula (Chrysis), Proc. Ent. Soc. Phil., iv, 308, ♀.
1843. Colorado. Wings in poor condition.
subvividis (Chrysis), Proc. Ent. Soc. Phil., iv, 109, ♂.
1846. Cuba. In good condition. The type specimen was returned by Gundlach.
superba (Chrysis), Proc. Ent. Soc. Phil., iv, 106, ♂.
Cuba. In Gundlach Collection.
venusta (Chrysis), Proc. Ent. Soc. Phil., iv, 311, ♂.
1842. Colorado. In good condition.
vernale (Hedychrum), Proc. Ent. Soc. Phil., iv, 104, ♂.
1835. Cuba. In good condition.
virens (Chrysis), Proc. Ent. Soc. Phil., iv, 309, ♀.
1851. Colorado. In good condition.
viride (Hedychrum), Proc. Ent. Soc. Phil., iv, 306.
1834. Colorado. In good condition.
viridis (Elampus), Proc. Ent. Soc. Phil., iv, 103, ♂?.
2682. Cuba. Condition poor; head and left wings off.
wiltii (Hedychrum), Proc. Ent. Soc. Phil., iv, 305.
1837. Colorado. In good condition.

FORMICIDAE

aterrima (Formica), Proc. Ent. Soc. Phil., iv, 426, ♂.
1853. Colorado. In good condition.

DORYLIDAE

minor (Labidus), Trans. Am. Ent. Soc., iv, 195, ♂.
1854. Texas. In good condition.
nigrescens (Labidus), Trans. Am. Ent. Soc., iv, 194, ♂.
1855. Texas. In good condition. Type returned by Belfrage.

MYRMICIDAE

occidentalis (Myrmica), Proc. Ent. Soc. Phil., iv, 426, ♀ ☿.
2722 ♀. Colorado. In good condition.
seminigra (Myrmica), Proc. Ent. Soc. Phil., iv, 427, ♂.
2721. Colorado. In good condition.

MUTILLIDAE

abadia (Mutilla), Trans. Am. Ent. Soc., xxviii, 64, ♂.
Santarem, Brazil. Type in Carnegie Museum, Pittsburgh, Pa.
acara (Mutilla), Trans. Am. Ent. Soc., xxviii, 79, ♂.
Chapada, Brazil. Carnegie Museum.
aegina (Mutilla), Proc. Ent. Soc. Phil., iv, 435, ♀.
1870. Colorado. In good condition.
aemulata (Mutilla), Trans. Am. Ent. Soc., xxviii, 50, ♀.
Chapada, Brazil. Carnegie Museum.
alagoa (Mutilla), Trans. Am. Ent. Soc., xxviii, 68, ♂.
Chapada, Brazil. Carnegie Museum.
albipes (Agama), Trans. Am. Ent. Soc., v. 99; Rep. Wheeler Expl., pl. 33, fig. 2; ♂.
1888. Nevada. In good condition.
almada (Mutilla), Trans. Am. Ent. Soc., xxviii, 74. ♂.
Brazil. Carnegie Museum.
andrei (Mutilla), Trans. Am. Ent. Soc., xxviii, 55, ♀.
Chapada, Brazil. Carnegie Museum.
araxa (Mutilla), Trans. Am. Ent. Soc., xxviii, 34, ♀.
Brazil. Carnegie Museum.
arota (Mutilla), Trans. Am. Ent. Soc., v, 120, ♀.
1873. San Diego, California. In good condition.
asopus (Mutilla), Proc. Ent. Soc. Phil., iv, 435, ♂.
1860. Colorado. In good condition.
aureola (Mutilla), Proc. Ent. Soc. Phil., iv, 386, ♀.
1879. California. Right posterior tibia and tarsus off.
auroplaga (Mutilla), Trans. Am. Ent. Soc., xxviii, 32, ♀.
Chapada, Brazil. Carnegie Museum.
auxiliaris (Mutilla), Trans. Am. Ent. Soc., xxviii, 53, ♀.
Chapada, Brazil. Carnegie Museum.
barboza (Mutilla), Trans. Am. Ent. Soc., xxviii, 67, ♂.
Chapada, Brazil. Carnegie Museum.
barra (Mutilla), Trans. Am. Ent. Soc., xxviii, 75, ♂.
Chapada, Brazil. Carnegie Museum.
beatula (Mutilla), Trans. Am. Ent. Soc., xxviii, 23, ♀.
Santarem, Brazil. Carnegie Museum.

bellica (Mutilla), Trans. Am. Ent. Soc., xxviii, 40, ♀.
Chapada, Brazil. Carnegie Museum.
bellicosa (Mutilla), Trans. Am. Ent. Soc., xxviii, 41, ♀.
Chapada, Brazil. Carnegie Museum.
bellifera (Mutilla), Trans. Am. Ent. Soc., xxviii, 41, ♀.
Chapada, Brazil. Carnegie Museum.
bellona (Mutilla), Proc. Ent. Soc. Phil., iv, 434, ♀.
1869. Colorado. In good condition.
bellula (Mutilla), Trans. Am. Ent. Soc., xxviii, 39, ♀.
Chapada, Brazil. Carnegie Museum.
benevola (Mutilla), Trans. Am. Ent. Soc., xxviii, 23, ♀.
Santarem, Brazil. Carnegie Museum.
bioculata (Mutilla), Proc. Ent. Soc. Phil., iv, 431, ♂.
1874. Colorado. In good condition.
bombycina (Mutilla), Trans. Am. Ent. Soc., xxviii, 36, ♀.
Chapada, Brazil. Carnegie Museum.
borba (Mutilla), Trans. Am. Ent. Soc., xxviii, 53, ♀.
Chapada, Brazil. Carnegie Museum.
calvaria (Mutilla), Trans. Am. Ent. Soc., xxviii, 32, ♀.
Chapada, Brazil. Carnegie Museum.
caneta (Mutilla), Trans. Am. Ent. Soc., xxviii, 73, ♂.
Chapada, Brazil. Carnegie Museum.
carinigena (Mutilla), Trans. Am. Ent. Soc., xxviii, 36, ♀.
Chapada, Brazil. Carnegie Museum.
carmo (Mutilla), Trans. Am. Ent. Soc., xxviii, 70, ♂.
Santarem, Brazil. Carnegie Museum.
castanea (Mutilla), Proc. Ent. Soc. Phil., iv, 388, ♂.
1894. Cape St. Lucas, Lower California. Left antenna off, also left anterior wing.
catinga (Mutilla), Trans. Am. Ent. Soc., xxviii, 64, ♂.
Santarem, Brazil. Carnegie Museum.
caxara (Mutilla), Trans. Am. Ent. Soc., xxviii, 73, ♂.
Chapada, Brazil. Carnegie Museum.
centromaculata (Mutilla), Trans. Am. Ent. Soc., xxviii, 27, ♀.
Paracary, Brazil. Carnegie Museum.
centrovittata (Mutilla), Trans. Am. Ent. Soc., xxviii, 31, ♀.
Chapada, Brazil. Carnegie Museum.
chapada (Mutilla), Trans. Am. Ent. Soc., xxviii, 45, ♀.
Chapada, Brazil. Carnegie Museum.
clara (Mutilla), Proc. Ent. Soc. Phil., iv, 439, ♂.
1881. Colorado. Right posterior leg off.
coimbra (Mutilla), Trans. Am. Ent. Soc., xxviii, 69, ♂.
Corumbá, Brazil. Carnegie Museum.
concolor (Mutilla), Proc. Ent. Soc. Phil., iv, 439, ♂.
1891. Colorado. In good condition.

connectens (Mutilla), Proc. Ent. Soc. Phil., iv, 387, ♀.
1856. Cape St. Lucas, Lower California. In good condition.
contumax (Mutilla), Proc. Ent. Soc. Phil., iv, 437, ♀.
1857. Colorado. In good condition.
cornigera (Mutilla), Trans. Am. Ent. Soc., xxviii, 15, ♀.
Chapada, Brazil. Carnegie Muesum.
credula (Mutilla), Trans. Am. Ent. Soc., xxviii, 19, ♀.
Santarem, Brazil. Carnegie Museum.
crepera (Mutilla), Trans. Am. Ent. Soc., xxviii, 19, ♀.
Benevides, Brazil. Carnegie Museum.
creusa (Mutilla), Proc. Ent. Soc. Phil., iv, 431, ♀.
1867. Colorado. In good condition.
crixa (Mutilla), Trans. Am. Ent. Soc., xxviii, 46, ♀.
Chapada, Brazil. Carnegie Museum.
croata (Mutilla), Trans. Am. Ent. Soc., xxviii, 63, ♂.
Brazil. Carnegie Museum.
crusa (Mutilla), Trans. Am. Ent. Soc., xxviii, 33, ♀.
Rio de Janeiro, Brazil. Carnegie Museum.
cuiba (Mutilla), Trans. Am. Ent. Soc., xxviii, 71, ♂.
Chapada, Brazil. Carnegie Museum.
curiosa (Mutilla), Trans. Am. Ent. Soc., xxviii, 35, ♀.
Chapada, Brazil. Carnegie Museum.
decussata (Mutilla), Trans. Am. Ent. Soc., xxviii, 15, ♀.
Rio de Janeiro, Brazil. Carnegie Museum.
demissa (Mutilla), Trans. Am. Ent. Soc., xxviii, 43, ♀.
Chapada, Brazil. Carnegie Museum.
dividua (Mutilla), Trans. Am. Ent. Soc., xxviii, 18, ♀.
Chapada, Brazil. Carnegie Museum.
dorsovittata (Mutilla), Trans. Am. Ent. Soc., xxviii, 44, ♀.
Brazil. Carnegie Museum.
edwardsii (Mutilla), Trans. Am. Ent. Soc., v, 119, ♂.
1880. Oregon. Left antenna off.
erudita (Mutilla), Trans. Am. Ent. Soc., v, 120, ♀.
1865. Searsville, California. Condition only fair.
escada (Mutilla), Trans. Am. Ent. Soc., xxviii, 60, ♂.
Rio de Janeiro, Brazil. Carnegie Museum.
estrella (Mutilla), Trans. Am. Ent. Soc., xxviii, 47, ♀.
Corumbá, Brazil. Carnegie Museum.
exclamationis (Mutilla), Trans. Am. Ent. Soc., xxviii, 17, ♀.
Chapada, Brazil. Carnegie Museum.
felix (Mutilla), Trans. Am. Ent. Soc., xxviii, 33, ♀.
Chapada, Brazil. Carnegie Museum.
frigidula (Mutilla), Trans. Am. Ent. Soc., xxviii, 40, ♀.
Santarem, Brazil. Carnegie Museum.

fulvohirta (Mutilla), Proc. Ent. Soc. Phil., iv, 433, ♂.
1882. Colorado. In good condition.
glabrella (Mutilla), Proc. Ent. Soc. Phil., iv, 441, ♂.
1893. Colorado. Tip of right antenna off.
infausta (Mutilla), Trans. Am. Ent. Soc., xxviii, 38, ♀.
Minas Geraes, Brazil. Carnegie Museum.
inga (Mutilla), Trans. Am. Ent. Soc., xxviii, 69, ♂.
Chapada, Brazil. Carnegie Museum.
integella (Mutilla), Trans. Am. Ent. Soc., xxviii, 23, ♀.
Chapada, Brazil. Carnegie Museum.
invitata (Mutilla), Trans. Am. Ent. Soc., xxviii, 22, ♀.
Chapada, Brazil. Carnegie Museum.
ipanema (Mutilla), Trans. Am. Ent. Soc., xxviii, 55, ♀.
Chapada, Brazil. Carnegie Museum.
iracunda (Mutilla), Trans. Am. Ent. Soc., xxviii, 16, ♀.
Santarem, Brazil. Carnegie Museum.
jatoba (Mutilla), Trans. Am. Ent. Soc., xxviii, 63, ♂.
Santarem, Brazil. Carnegie Museum.
laguna (Mutilla), Trans. Am. Ent. Soc., xxviii, 62, ♂.
Chapada, Brazil. Carnegie Museum.
latevittata (Mutilla), Trans. Am. Ent. Soc., xxviii, 42, ♀.
Chapada, Brazil. Carnegie Museum.
lorena (Mutilla), Trans. Am. Ent. Soc., xxviii, 72, ♂.
Chapada, Brazil. Carnegie Museum.
macapa (Mutilla), Trans. Am. Ent. Soc., xxviii, 59, ♂.
Chapada, Brazil. Carnegie Museum.
macra (Mutilla), Proc. Ent. Soc. Phil., iv, 429, ♂.
1876. Colorado. In good condition.
magna (Mutilla), Proc. Ent. Soc. Phil., iv, 385, ♀.
1863. Cape St. Lucas, Lower California. Condition fairly good.
manca (Mutilla), Trans. Am. Ent. Soc., xxviii, 52, ♀.
Chapada, Brazil. Carnegie Museum.
manga (Mutilla), Trans. Am. Ent. Soc., xxviii, 60, ♂.
Chapada, Brazil. Carnegie Museum.
maraca (Mutilla), Trans. Am. Ent. Soc., xxviii, 78, ♂.
Santarem, Brazil. Carnegie Museum.
medea (Mutilla), Proc. Ent. Soc. Phil., iv, 432, ♀.
1868. Colorado. In good condition.
molaca (Mutilla), Trans. Am. Ent. Soc., xxviii, 69, ♂.
Rio de Janeiro, Brazil. Carnegie Museum.
monticola (Mutilla), Proc. Ent. Soc. Phil., iv, 430, ♂.
1877. Colorado. In good condition.
montivaga (Mutilla), Proc. Ent. Soc. Phil., iv, 436, ♀.
1858. Colorado. In good condition.

morada (Mutilla), Trans. Am. Ent. Soc., xxviii, 63, ♂.
Santarem, Brazil. Carnegie Museum.
mundula (Mutilla), Trans. Am. Ent. Soc., xxviii, 54, ♀.
Chapada, Brazil. Carnegie Museum.
nigriceps (Mutilla), Proc. Ent. Soc. Phil., iv, 110, ♀.
1883. Cuba. In good condition.
nitida (Agama), Report Wheeler Expl., 1875, 710, ♂.
1892. Colorado. In good condition.
nubecula (Mutilla), Proc. Ent. Soc. Phil., iv, 440, ♂.
1889. Colorado. In good condition.
onca (Mutilla), Trans. Am. Ent. Soc., xxviii, 64, ♂.
Chapada, Brazil. Carnegie Museum.
optata (Mutilla), Trans. Am. Ent. Soc., xxviii, 52, ♀.
Brazil. Carnegie Museum.
orbana (Mutilla), Trans. Am. Ent. Soc., xxviii, 71, ♂.
Chapada, Brazil. Carnegie Museum.
orcus (Mutilla), Proc. Ent. Soc. Phil., iv, 428, ♀ ♂.
1866 ♀. Colorado. In good condition.
ornativentris (Mutilla), Proc. Ent. Soc. Phil., iv, 438, ♀.
1886. Colorado. In good condition.
pacata (Mutilla), Trans. Am. Ent. Soc., xxviii, 21, ♀.
Santarem, Brazil. Carnegie Museum.
pacifica (Mutilla), Trans. Am. Ent. Soc., v, 120, ♀.
1878. California. In good condition.
palliceps (Mutilla), Proc. Ent. Soc. Phil., iv, 112, ♀.
1885. Cuba. In good condition.
parata (Mutilla), Trans. Am. Ent. Soc., xxviii, 20, ♀.
Rio de Janeiro, Brazil. Carnegie Museum.
paulula (Mutilla), Trans. Am. Ent. Soc., xxviii, 19, ♀.
Chapada, Brazil. Carnegie Museum.
peculiaris (Mutilla), Trans. Am. Ent. Soc., v, 119, ♀.
1890. California. In good condition.
pergrata (Mutilla), Trans. Am. Ent. Soc., xxviii, 21, ♀.
Rio de Janeiro, Brazil. Carnegie Museum.
picada (Mutilla), Trans. Am. Ent. Soc., xxviii, 74, ♂.
Santarem, Brazil. Carnegie Museum.
pinha (Mutilla), Trans. Am. Ent. Soc., xxviii, 66, ♂.
Rio de Janeiro, Brazil. Carnegie Museum.
pomba (Mutilla), Trans. Am. Ent. Soc., xxviii, 79, ♂.
Santarem, Brazil. Carnegie Museum.
projectifrons (Mutilla), Trans. Am. Ent. Soc., xxviii, 33, ♀.
Chapada, Brazil. Carnegie Museum.
propinqua (Mutilla), Proc. Ent. Soc. Phil., iv, 433, ♂.
1859. Colorado. In good condition.

rubriceps (Mutilla), Proc. Ent. Soc. Phil., iv, 111, ♀.
Cuba. In Gundlach Collection.
sabara (Mutilla), Trans. Am. Ent. Soc., xxviii, 78, ♂.
Brazil. Carnegie Museum.
sackenii (Mutilla), Proc. Ent. Soc. Phil., iv, 385, ♀.
1864. California. Tips of antennae off.
seducta (Mutilla), Trans. Am. Ent. Soc., xxviii, 16, ♀.
Chapada, Brazil. Carnegie Museum.
serra (Mutilla), Trans. Am. Ent. Soc., xxviii, 77, ♂.
Chapada, Brazil. Carnegie Museum.
sincora (Mutilla), Trans. Am. Ent. Soc., xxviii, 65, ♂.
Rio de Janeiro, Brazil. Carnegie Museum.
smithii (Mutilla), Trans. Am. Ent. Soc., xxviii, 27, ♀.
Chapada, Brazil. Carnegie Museum.
sodalis (Mutilla), Trans. Am. Ent. Soc., xxviii, 52, ♀.
Chapada, Brazil. Carnegie Museum.
solemnis (Mutilla), Trans. Am. Ent. Soc., xxviii, 49, ♀.
Minas Geraes, Brazil. Carnegie Museum.
spiniceps (Mutilla), Trans. Am. Ent. Soc., xxviii, 26, ♀.
Santarem, Brazil. Carnegie Museum.
taboca (Mutilla), Trans. Am. Ent. Soc., xxviii, 78, ♂.
Chapada, Brazil. Carnegie Museum.
tantula (Mutilla), Trans. Am. Ent. Soc., xxviii, 22, ♀.
Corumbá, Brazil. Carnegie Museum.
tapera (Mutilla), Trans. Am. Ent. Soc., xxviii, 76, ♂.
Chapada, Brazil. Carnegie Museum.
tecta (Mutilla), Trans. Am. Ent. Soc., v, 119, ♀.
1861. California. In good condition.
texana (Mutilla), Trans. Am. Ent. Soc., v, 120, ♂.
2681. Texas. In good condition. This was published as a variety of *ursula* Cresson, but is probably the same as *chiron* Blake.
turnalis (Mutilla), Trans. Am. Ent. Soc., xxviii, 34, ♀.
Brazil. Carnegie Museum.
ulkei (Mutilla), Proc. Ent. Soc. Phil., iv, 387, ♀.
1872. Cape St. Lucas, Lower California. In good condition.
unicolor (Mutilla), Proc. Ent. Soc. Phil., iv, 389, ♂.
1887. California. Left antenna off.
unimarginata (Mutilla), Trans. Am. Ent. Soc., xxviii, 54, ♀.
Chapada, Brazil. Carnegie Museum.
ursula (Mutilla), Trans. Am. Ent. Soc., v, 120, ♂.
1875. Texas. In good condition.
valenca (Mutilla), Trans. Am. Ent. Soc., xxviii, 80, ♂.
Rio de Janeiro, Brazil. Carnegie Museum.

vera (Mutilla), Trans. Am. Ent. Soc., xxviii, 25, ♀.
Chapada, Brazil. Carnegie Museum.
verecunda (Mutilla), Trans. Am. Ent. Soc., xxviii, 24, ♀.
Chapada, Brazil. Carnegie Museum.
vesta (Mutilla), Proc. Ent. Soc. Phil., iv, 436, ♀.
1871. Colorado. In good condition.
viana (Mutilla), Trans. Am. Ent. Soc., xxviii, 77, ♂.
Chapada, Brazil. Carnegie Museum.
vicosa (Mutilla), Trans. Am. Ent. Soc., xxviii, 65, ♂.
Chapada, Brazil. Carnegie Museum.
victura (Mutilla), Trans. Am. Ent. Soc., xxviii, 29, ♀.
Chapada, Brazil. Carnegie Museum.
vivata (Mutilla), Trans. Am. Ent. Soc., xxviii, 51, ♀.
Chapada, Brazil. Carnegie Museum.
wilsoni (Mutilla), Proc. Ent. Soc. Phil., iv, 112, ♂.
1884. Cuba. Both antennae broken, and upper right wing off.
zapara (Mutilla), Trans. Am. Ent. Soc., xxviii, 75, ♂.
Chapada, Brazil. Carnegie Museum.

SCOLIIDAE

albopicta (Myzine), Proc. Ent. Soc. Phil., iv, 114, ♂.
Cuba. In Gundlach Collection.
amoena (Scolia), Proc. Ent. Soc. Phil., iv, 447, ♂.
567. Colorado. In good condition.
apicalis (Myzine), Proc. Ent. Soc. Phil., iv, 117, ♂.
576. Cuba. Right antenna broken.
argentipes (Tiphia), Proc. Ent. Soc. Phil., iv, 117, ♀ ♂.
579 ♀. Cuba. In good condition.
confluens (Myzine), Proc. Ent. Soc. Phil., iv, 443, ♀.
573. Colorado. In good condition.
consors (Scolia), Proc. Ent. Soc. Phil., iv, 449, ♂.
571. Colorado. In good condition. Name preoccupied; renamed *Elis zonaria* Cresson.
dubiosa (Myzine), Trans. Am. Ent. Soc., iv, 200, ♀.
577. Texas. In good condition. Type returned by Belfrage.
flavocostalis (Scolia-Discolia), Trans. Am. Ent. Soc., i, 377, ♂.
569. New Mexico. In good condition.
flavosignata (Scolia), Proc. Ent. Soc. Phil., iv, 449, ♂.
572. Colorado. In good condition.
frontalis (Myzine), Report Wheeler Expl., 1875, 711, ♀.
1895. New Mexico. In good condition.
fulvohirta (Scolia-Elis), Proc. Ent. Soc. Phil., iv, 119, ♀ ♂.
184 ♀. Cuba. In good condition.

hyalina (Myzine), Proc. Ent. Soc. Phil., iv, 442, ♂.
574. Colorado. In good condition.
inconstans (Scolia), Proc. Ent. Soc. Phil., iv, 446, ♂.
568. Colorado. In good condition.
lateralis (Myzine), Proc. Ent. Soc. Phil., iv, 115, ♀.
575. Cuba. In good condition.
lecontei (Scolia-Discolia), Trans. Am. Ent. Soc., i, 376, ♀.
566. New Mexico. In good condition.
lupina (Elis), Trans. Am. Ent. Soc., iv, 202, ♀.
Texas. In Coll. Mus. Comp. Zool.; type No. 596. In good condition.
luteipennis (Tiphia), Proc. Ent. Soc. Phil., iv, 445, ♀.
580. Colorado. In good condition.
regina (Scolia), Proc. Ent. Soc. Phil., iv, 447, ♀.
570. Colorado. In good condition.
ridingsii (Scolia), Proc. Ent. Soc. Phil., iv, 445, ♀.
565. Colorado. In good condition.
rufiventris (Myzine), Trans. Am. Ent. Soc., iv, 201, ♂.
Texas. In Coll. Mus. Comp. Zool.; type No. 595. In good condition.
striata (Myzine), Proc. Ent. Soc. Phil., iv, 116, ♀.
Cuba. In Gundlach Collection.
texana (Myzine), Trans. Am. Ent. Soc., iv, 200, ♀.
578. Comal County, Texas. In good condition.
zonaria (Elis), Trans. Am. Ent. Soc., i, 378, ♂.
See *Scolia consors* || Cresson.

SAPYGIDAE

aculeata (Sapyga), Proc. Ent. Soc. Phil., iv, 450, ♀.
132. Colorado. Left antenna off beyond third joint.
americana (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♀.
139. New York. In good condition.
angustata (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♂.
137. California. Left antenna off beyond third joint, also right anterior wing.
californica (Eusapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♂.
143. California. Left posterior tarsus off.
coloradensis (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♂.
141. Colorado. In good condition.
confluenta (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♂.
2680. Colorado. In good condition.
elegans (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♂ ♀.
142 ♀. Nevada. Left antenna off beyond joint three.
emarginata (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♀.
134. Colorado. Left posterior tarsus off.
fulvicornis (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♂.
2679. Nevada. Left antenna off beyond joint five.

moesta (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♂.
135. Nevada. Right upper wing detached.
montana (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♀.
140. Nevada. Right antenna off.
nevadica (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♂.
136. Nevada. Right antenna off beyond joint five.
nigripes (Eusapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♂.
144. Nevada. Left upper wing off; the other wings in poor condition.
obscura (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♂.
2678. Nevada. In good condition.
proxima (Eusapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♂.
145. Colorado. In good condition.
pumila (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♀.
133. Nevada. In good condition.
rubripes (Eusapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♂ ♀.
147 ♀. Texas. In good condition.
truncata (Sapyga), Proc. Ent. Sec. A. N. S., 1880, xxi, ♂.
138. Nevada. Left antenna off beyond joint three; also both upper wings and both posterior tibiae and tarsi.
verticalis (Eusapyga), Proc. Ent. Sec. A. N. S., 1880, xx, ♀.
146. Nevada. In good condition.

POMPILIDAE

acceptus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 130, fig. 11, ♀.
469. Georgia. In good condition.
accolens (Pompilus-Agenia), Proc. Bost. Soc. N. H., xii, 374, ♂.
481. Orizaba. Mexico. In good condition. Described as a variety of *calcaratus* Cresson.
aethiops (Pompilus), Proc. Ent. Soc. Phil., iv, 451, ♀.
413. Colorado. In good condition.
agilis (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 126, ♂.
463. West Virginia. In good condition.
albopicta (Ceropales), Proc. Bost. Soc. N. H., xii, 378, ♂.
448. Orizaba, Mexico. In good condition.
albopilosus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 125, ♂.
459. West Virginia. In good condition.
anceps (Pompilus), Proc. Ent. Soc. Phil., iv, 130, ♂.
420. Cuba. Tip of right antenna off. Name preoccupied; renamed *cubensis* Cresson.
angustatus (Pompilus), Proc. Ent. Soc. Phil., iv, 452, ♀ ♂.
418 ♀. Colorado. Right antenna off beyond joint three.
arctus (Pompilus), Proc. Ent. Soc. Phil., iv, 453, ♀.
554. Colorado. Antennae off beyond joint three, also right posterior leg.

argenteus (Pompilus), Trans. Am. Ent. Soc., i, 93, ♂.
556. West Virginia. In good condition.
auripilis (Pompilus-Agenia), Proc. Bost. Soc. N. H., xii, 373, ♀ ♂.
477 ♀. Orizaba, Mexico. In good condition.
azteca (Ferreola), Proc. Bost. Soc. N. H., xii, 376, ♀.
437. Vera Cruz, Mexico. In good condition.
azureus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 131, ♀.
472. Vera Cruz, Mexico. In good condition.
belfragei (Agenia), Trans. Am. Ent. Soc., iv, 205, ♂.
473. Texas. In good condition.
bellus (Pompilus), Proc. Ent. Soc. Phil., iv, 124, ♀ ♂.
475 ♀. Cuba. Apical half of left antenna off.
bombycinus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 125, ♀ ♂.
460 ♀. West Virginia. Left antenna off.
brevicornis (Pompilus), Trans. Am. Ent. Soc., i, 90, ♂.
550. Pennsylvania. Left antenna off beyond joint four.
brevis (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 123, fig. 9, ♂.
456. Georgia. In good condition.
burrus (Pompilus), Proc. Bost. Soc. N. H., xii, 371, ♀.
429. Vera Cruz, Mexico. In good condition. Described as a variety of *torridus* Smith.
calcaratus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 128, ♂.
466. Pennsylvania. In good condition.
chloris (Pompilus-Agenia), Proc. Bost. Soc. N. H., xii, 373, ♀.
478. Orizaba, Mexico. Both antennae off.
cincticornis (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 120, ♀.
497. Vera Cruz, Mexico. In good condition.
cinctipes (Pompilus), Trans. Am. Ent. Soc., i, 102, ♂.
A new name substituted for *apicalis* || Say, *nec* Van der Linden.
clypeatus (Ceropales), Proc. Ent. Soc. Phil., iv, 133, ♀.
Cuba. In Gundlach Collection.
collaris (Planiceps), Proc. Ent. Soc. Phil., iv, 132, ♀.
432. Cuba. Upper left wing off. Name preoccupied; renamed *troglodytes* D. T.
compressiventris (Pompilus), Proc. Ent. Soc. Phil., iv, 127, ♀.
Cuba. In Gundlach Collection.
concinnus (Pompilus), Proc. Ent. Soc. Phil., iv, 122, ♀ ♂.
427 ♀. Cuba. In good condition. Name preoccupied; renamed *mundus* Cresson.
confusaneus (Pompilus), Proc. Bost. Soc., N. H., xii, 369, ♂.
559. Orizaba, Mexico. In good condition.
congruus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 129, fig. 10, ♀.
467. West Virginia. Left antenna, and left posterior tarsus, off.
connexus (Pompilus), Proc. Bost. Soc. N. H., xii, 369, ♂.
560. Orizaba, Mexico. In good condition.

contiguus (Parapompilus), Trans. Am. Ent. Soc., iv, 206, ♀.
Texas. In Coll. Mus. Comp. Zool; type No. 499. In good condition.
cubensis (Ceropales), Proc. Ent. Soc. Phil., iv, 132, ♀.
446. Cuba. In good condition. The type-specimen returned by Gundlach.
cubensis (Planiceps), Trans. Am. Ent. Soc., i, 136, ♂.
Cuba. In Gundlach Collection.
cubensis (Pompilus), Trans. Am. Ent. Soc., i, 93.
See *anceps* || Cresson, *nec* Smith.
cupidus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 122, ♀.
454. West Virginia. In good condition.
cylindricus (Pompilus), Trans. Am. Ent. Soc., i, 92, fig. 4, ♂.
553. Texas. In good condition.
dakota (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 124, ♂.
457. Dakota. In good condition.
divisus (Pompilus), Trans. Am. Ent. Soc., i, 100, ♀.
424. Georgia. Right antenna off.
dorsalis (Notocyphus), Trans. Am. Ent. Soc., iv, 207, ♀.
485. Texas. In good condition.
dubitata (Pepsis), Trans. Am. Ent. Soc., i, 144, ♀ ♂.
400 ♀. Georgia. In good condition.
elegans (Ceropales), Trans. Am. Ent. Soc., iv, 208, ♀.
451. Texas. In good condition. Type returned by Belfrage.
elegans (Pompilus), Proc. Ent. Soc. Phil., iv, 126, ♀.
Cuba. In Gundlach Collection.
facetus (Priocnemis), Trans. Am. Ent. Soc., iv, 205, ♀.
499. Texas. In good condition. Type returned by Belfrage.
femoralis (Ceropales), Proc. Bost. Soc. N. H., xii, 378, ♀.
449. Orizaba, Mexico. Tips of antennae off.
feralis (Planiceps), Trans. Am. Ent. Soc., iv, 207, ♀.
433. Texas. In good condition. Type returned by Belfrage.
floridus (Agenia), Proc. Bost. Soc. Nat. Hist., xii, 373, ♀ ♂.
598 ♀. Orizaba, Mexico. Flagellum of both antennae off except base; right posterior tibia and tarsus and right anterior wing, off. Described as a variety of *mexicanus* Cresson.
fortis (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 113, ♀.
487. New York. In good condition.
fulgidus (Pompilus), Proc. Ent. Soc. Phil., iv, 131, ♀.
562. Cuba. Legs more or less broken.
fulgifrons (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 114, ♀.
489. West Virginia. In good condition.
fulvicornis (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 112, ♀ ♂.
410 ♀. Pennsylvania. In good condition.
fulvipes (Ceropales), Trans. Am. Ent. Soc., iv, 208, ♀.
445. Texas. Apical half of left antenna off.

germanus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 116, ♀.
491. Delaware. In good condition.

gloriosus (Pompilus), Proc. Bost. Soc. N. H., xii, 368, ♀.
558. Orizaba, Mexico. In good condition.

gundlachii (Pompilus), Proc. Ent. Soc. Phil., iv, 122, ♀.
Cuba. In Gundlach Collection.

heiligbrodtii (Priocnemis), Trans. Am. Ent. Soc., iv, 204, ♀.
Texas. (Coll. L. Heiligbrodt.) Type No. 1669 in U. S. Nat. Museum. "Condition good."

humilis (Pompilus), Trans. Am. Ent. Soc., i, 91, ♀.
552. New York. In good condition.

hyacinthinus (Pompilus), Trans. Am. Ent. Soc., i, 90, ♀.
Connecticut. (Norton Collection.) Type probably lost.

ignicornis (Pepsis), Proc. Ent. Soc. Phil., iv, 134, ♂.
406. Cuba. In good condition.

ignipennis (Pompilus), Proc. Ent. Soc. Phil., iv, 121, ♀ ♂.
2110 ♀. Cuba. In good condition.

impiger (Pompilus-Priocnemis), Proc. Bost. Soc. N. H., xii, 371, ♀.
545. Orizaba, Mexico. In good condition.

ingenuus (Pompilus), Trans. Am. Ent. Soc., i, 89, ♀ ♂.
419 ♀. Dakota. In good condition.

insignis (Pompilus), Trans. Am. Ent. Soc., i, 103, ♀.
422. Cuba. In good condition. Described as a variety of *coruscus* Smith.

iridipennis (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 127, ♂.
465. West Virginia. Extreme tip of antennae off.

juxtus (Pompilus), Proc. Ent. Soc. Phil., iv, 128; Trans. i, 103, ♀.
421. Cuba. In good condition.

laevifrons (Ferreola), Proc. Bost. Soc. N. H., xii, 376, ♀.
436. Orizaba, Mexico. In good condition.

legatus (Pompilus?), Trans. Am. Ent. Soc., i, 109, ♀.
438. Georgia. Tip of abdomen bulged.

levipes (Pompilus-Agenia), Proc. Bost. Soc. N. H., xii, 374, ♂.
480. Orizaba, Mexico. Tip of antennae off and legs more or less broken.

longa (Agenia), Trans. Am. Ent. Soc., iv, 205, ♀.
474. Texas. In good condition. Type returned by Belfrage.

longulus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 129, ♂.
468. Dakota. In good condition.

luctuosus (Pompilus), Proc. Ent. Soc. Phil., iv, 452, ♀.
416. Colorado. In good condition.

macer (Pompilus), Proc. Ent. Soc. Phil., iv, 125, ♂.
Cuba. In Gundlach Collection.

magnus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 111, ♀.
409. Georgia. In good condition.

mariae (Pompilus?), Trans. Am. Ent. Soc., i, 108, fig. 6, ♀.
439. Pennsylvania. Antennae off beyond joint four.
maurus (Pompilus), Trans. Am. Ent. Soc., i, 88, ♀ ♂.
414 ♀. West Virginia. In good condition.
mexicana (Ceropales), Proc. Bost. Soc. N. H., xii, 377, ♂ ♀.
447 ♀. Orizaba, Mexico. In good condition.
mexicana (Mygnimia), Trans. Am. Ent. Soc., i, 143, ♀.
407 ♀. Vera Cruz, Mexico. In good condition.
mexicanus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 130, ♀.
470. Vera Cruz, Mexico. In good condition.
minimus (Aporus), Trans. Am. Ent. Soc., iv, 207, ♂.
434. Texas. In good condition. Type returned by Belfrage.
mundus (Pompilus), Trans. Am. Ent. Soc., i, 106.
See *concinnus* || Cresson, *nec* Wesmael.
navus (Pompilus), Trans. Am. Ent. Soc., i, 105, ♀ ♂.
426 ♀. Georgia. In good condition.
niger (Planiceps), Trans. Am. Ent. Soc., i, 136, ♀.
431. Georgia. Right posterior leg off. Name preoccupied; renamed *clericus* Dalla Torre.
nigripes (Ceropales), Trans. Am. Ent. Soc., i, 139, ♀.
443. Dakota. In good condition.
nigripes (Pompilus), Proc. Ent. Soc. Phil., iv, 454, ♀.
493. Colorado. In good condition.
nigropilosus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 124, ♂.
458. West Virginia. In good condition.
nothus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 118, ♀.
Connecticut. (Coll. Norton.) Type probably lost.
novellus (Pompilus), Proc. Bost. Soc. N. H., xii, 367, ♀.
425. Orizaba, Mexico. In good condition.
nubeculatus (Pompilus), Proc. Ent. Soc. Phil., iv, 123, ♀.
Cuba. In Gundlach Collection.
nubifer (Pompilus-Agenia), Proc. Bost. Soc. N. H., xii, 374, ♀.
479. Orizaba, Mexico. Tip of right antenna off.
nuperus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 118, ♀.
495. Pennsylvania. In good condition.
orbitalis (Pompilus), Proc. Ent. Soc. Phil., iv, 131, ♀.
Cuba. In Gundlach Collection.
panamensis (Mygnimia), Trans. Am. Ent. Soc., i, 150, ♀.
Panama. (Coll. Norton.) Type probably lost.
parcus (Pompilus), Trans. Am. Ent. Soc., i, 119.
See *terminatus* || Cresson, *nec* Smith.
parvus (Pompilus), Proc. Ent. Soc. Phil., iv, 453, ♀.
549. Colorado. In good condition.

petiolatus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 127, ♂.
464. Illinois. Tip of antennae and left posterior leg off.

pomilius (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 116, ♀.
490. Pennsylvania. In good condition.

pulchellus (Pompilus), Proc. Ent. Soc. Phil., iv, 126, ♀.
498. Cuba. In good condition.

pulchrinus (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 126, ♂.
462. West Virginia. In good condition.

pulchripennis (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 123, ♂ ♀.
455 ♀. West Virginia. In good condition.

purpuripennis (Pompilus), Proc. Ent. Soc. Phil., iv, 130, ♀.
442. Cuba. Tip of anterior wings broken.

robinsonii (Ceropales), Trans. Am. Ent. Soc., i, 140, fig. 15, ♂.
450. West Virginia. In good condition.

rufiventris (Aporus), Trans. Am. Ent. Soc., iv, 207, ♀.
435. Texas. Head off, abdomen detached. Type returned by Belfrage.

rupex (Pompilus-Priocnemis), Proc. Bost. Soc. N. H., xii, 372, ♀.
546. Orizaba, Mexico. In good condition.

sartorianus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 120, ♀.
496. Vera Cruz, Mexico. In good condition.

scelestus (Pompilus), Proc. Ent. Soc. Phil., iv, 451, ♀ ♂.
415 ♀. Colorado. In good condition.

scitulus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 118, ♀.
494. Illinois. In good condition.

semirufus (Pompilus), Trans. Am. Ent. Soc., i, 100, ♀.
423. Georgia. Both antennae off.

sericatus (Pompilus), Trans. Am. Ent. Soc., iv, 202, ♂.
411. Texas. Apical two-thirds of left antenna and left tibia and tarsus, off.
Described as a variety of *philadelphicus* St. Fargeau.

simulans (Pompilus), Proc. Bost. Soc. N. H., xii, 367, ♂.
557. Orizaba, Mexico. Tip of antennae off.

subargenteus (Pompilus), Proc. Ent. Soc. Phil., iv, 129, ♂.
Cuba. In Gundlach Collection.

subopacus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 114, ♀ ♂.
488 ♀. Pennsylvania. In good condition.

subviolaceus (Pompilus), Trans. Am. Ent. Soc., i, 91, ♀.
551. Delaware. In good condition.

subvirescens (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 131, ♀.
471. Vera Cruz, Mexico. Left antenna off beyond joint four.

sumichrastii (Pompilus-Agenia), Proc. Bost. Soc. N. H., xii, 374, ♀.
482. Orizaba, Mexico. In good condition.

tenebrosus (Pompilus), Proc. Ent. Soc. Phil., iv, 453, ♀.
417. Colorado. In good condition.

terminatus (Pompilus), Proc. Ent. Soc. Phil., iv, 128, ♀.
547. Cuba. Head off. Name preoccupied; renamed *parcus* Cresson.
texana (Ceropales), Trans. Am. Ent. Soc., iv, 208, ♂.
Texas. In Belfrage Collection; type No. 1680, U. S. N. M. "Right antenna wanting beyond fifth joint; hind tarsi have only basal joint."
texanus (Notocyphus), Trans. Am. Ent. Soc., iv, 207, ♂.
486. Texas. In good condition.
texanus (Parapompilus), Trans. Am. Ent. Soc., iv, 206, ♀.
441. Texas. In good condition.
texanus (Priocnemis), Trans. Am. Ent. Soc., iv, 204, ♀ ♂.
408 ♀. Texas. In good condition.
unicus (Pompilus), Trans. Am. Ent. Soc., i, 95, ♂.
Cuba. In Gundlach Collection.
uniformis (Pompilus), Proc. Ent. Soc. Phil., iv, 125, ♀ ♂.
430 ♀. Cuba. Left posterior leg off beyond coxa.
validus (Pompilus-Priocnemis), Trans. Am. Ent. Soc., i, 116, ♀.
492. Georgia. In good condition.
varipes (Pompilus-Agenia), Trans. Am. Ent. Soc., i, 126, ♀.
461. Illionis. In good condition. Name preoccupied; renamed *varitarsata* Dalla Torre.
vicinus (Parapompilus), Trans. Am. Ent. Soc., iv, 206, ♀.
440. Texas. Right wings off. Name preoccupied; renamed *bombinator* Dalla Torre.
violaceipes (Pompilus), Proc. Ent. Soc. Phil., iv, 129, ♀.
476. Cuba. In good condition.
virginiensis (Pompilus), Trans. Am. Ent. Soc., i, 92, ♂.
555. West Virginia. Left antenna off.

SPHECIDAE

abdominalis (Sphex), Trans. Am. Ent. Soc., iv, 211, ♂.
Texas. In Belfrage Collection; type No. 1689, U. S. N. M. "Condition good."
annulatus (Pelopoeus), Proc. Ent. Soc. Phil., iv, 135, ♀ ♂.
2673 ♀. Cuba. Right posterior tarsus off.
argentifrons (Ammophila), Proc. Ent. Soc. Phil., iv, 462, ♂.
1923. Colorado. In good condition.
argentifrons (Pelopoeus), Proc. Ent. Soc. Phil., iv, 136, ♀.
2676. Cuba. Right posterior tarsus broken.
belfragei (Sphex), Trans. Am. Ent. Soc., iv, 212, ♂ ♀.
1741 ♀. Texas. In good condition.
brunnipes (Priononyx), Trans. Am. Ent. Soc., iv, 213, ♂.
Texas. In Belfrage Collection; type No. 1691, U. S. N. M. "Condition good."

collaris (Ammophila), Proc. Ent. Soc. Phil., iv, 456, ♂.
1934. Colorado. In good condition.
communis (Ammophila), Proc. Ent. Soc. Phil., iv, 462, ♂.
1921. Colorado. Right antenna off beyond joint four.
dubitata (Sphex), Trans. Am. Ent. Soc., iv, 213, ♀.
594. Texas. In good condition.
extrematata (Ammophila), Proc. Ent. Soc. Phil., iv, 457, ♀.
1925. Colorado. In good condition.
ferruginosa (Ammophila), Proc. Ent. Soc. Phil., iv, 455, ♀.
1932. Colorado. In good condition.
fulvipes (Podium), Proc. Ent. Soc. Phil., iv, 136, ♀.
2674. Cuba. Both antennae off, and wings in poor condition.
grossa (Ammophila), Trans. Am. Ent. Soc., iv, 209, ♀.
Texas. (Coll. L. Heiligbrodt.) In the U. S. Nat. Museum.
illustris (Sphex), Trans. Am. Ent. Soc., iv, 212, ♀.
590. Texas. In good condition. Described as a variety of *lauta* Cresson.
inepta (Ammophila), Trans. Am. Ent. Soc., iv, 209, ♀ ♂.
2677 ♀. Texas. Left antenna off beyond joint three.
juncea (Ammophila), Proc. Ent. Soc. Phil., iv, 460, ♂.
1927. Colorado. In good condition.
laeviventris (Sphex), Proc. Ent. Soc. Phil., iv, 463, ♀ ♂.
587 ♀. Colorado. In good condition.
lauta (Sphex), Trans. Am. Ent. Soc., iv, 212, ♀.
1919. Texas. In good condition.
macra (Ammophila), Proc. Ent. Soc. Phil., iv, 460, ♂.
1936. Colorado. In good condition.
mandibularis (Sphex), Trans. Am. Ent. Soc., ii, 293, ♀.
596. Cuba. In good condition.
mediata (Ammophila), Proc. Ent. Soc. Phil., iv, 459, ♀ ♂.
1924 ♀. Colorado. Left antenna off beyond joint four.
polita (Ammophila), Proc. Ent. Soc. Phil., iv, 458, ♀.
1931. Colorado. Antennae broken; right posterior tibia and tarsus off.
pruinosa (Ammophila), Proc. Ent. Soc. Phil., iv, 455, ♀ ♂.
1933 ♀. Colorado. In good condition.
robusta (Ammophila), Proc. Ent. Soc. Phil., iv, 461, ♀.
1920. Colorado. In good condition.
rufiventris (Sphex), Trans. Am. Ent. Soc., iv, 211, ♀.
1918. Texas. In good condition.
strenua (Ammophila), Proc. Ent. Soc. Phil., iv, 459, ♀.
1928. Colorado. In good condition.
texana (Sphex), Trans. Am. Ent. Soc., iv, 212, ♂ ♀.
595 ♀. Texas. In good condition.
texanus (Pelopoeus), Trans. Am. Ent. Soc., iv, 210, ♂.
2675. Comal County, Texas. In good condition.

valida (Ammophila), Proc. Ent. Soc. Phil., iv, 461, ♀.
1922. Colorado. In good condition.
varipes (Ammophila), Proc. Ent. Soc. Phil., iv, 457, ♀ ♂.
1929 ♀. Colorado. In good condition.
vulgaris (Ammophila), Proc. Ent. Soc. Phil., iv, 458, ♀ ♂.
1926 ♀. Colorado. In good condition.
wrightii (Coloptera), Trans. Am. Ent. Soc., i, 378, ♀.
1935. New Mexico. Wings more or less frayed.
yarrowi (Ammophila), Report Wheeler Expl., 1875, 713, ♂.
1930. Pueblo, Colorado. In good condition.

LARRIDAE

aethiops (Larrada), Proc. Ent. Soc. Phil., iv, 465, ♀.
2016. Colorado. In good condition.
americana (Larrada), Trans. Am. Ent. Soc., iv, 214, ♂.
2000. Texas. In good condition.
belfragei (Larrada), Trans. Am. Ent. Soc., iv, 215, ♀.
Texas. In Belfrage Collection; type No. 1696, U. S. N. M. "Abdomen wanting."
bella (Astata), Proc. Ent. Sec. A. N. S., 1881, vi, ♂.
1996. San Diego, California. In good condition.
breviventris (Tachytes), Trans. Am. Ent. Soc., iv, 216, ♂.
2004. Texas. In good condition.
brunneipes (Liris), Proc. Ent. Sec. A. N. S., 1881, iii, ♀ ♂.
2017 ♀. Colorado. In good condition.
caerulea (Astata), Proc. Ent. Sec. A. N. S., 1881, iv, ♂.
1997. Nevada. In good condition.
cubensis (Tachytes), Proc. Ent. Soc. Phil., iv, 139, ♀ ♂.
Cuba. In Gundlach Collection.
elegans (Astata), Proc. Ent. Sec. A. N. S., 1881, vi, ♀ ♂.
1995 ♀. Washington Territory. In good condition.
elongatus (Tachytes), Trans. Am. Ent. Soc., iv, 215, ♂.
2006. Texas. In good condition.
fulviventris (Tachytes), Proc. Ent. Soc. Phil., iv, 466, ♀.
2005. Colorado. In good condition.
insularis (Astata), Proc. Ent. Soc. Phil., iv, 140, ♀.
1999. Cuba. Tips of wings ragged. The type-specimen was returned by Gundlach.
insularis (Tachytes), Proc. Ent. Soc. Phil., iv, 140, ♀ ♂.
2011 ♀. Cuba. Left antenna broken.
luteipennis (Larrada), Trans. Am. Ent. Soc., ii, 293, ♂.
2002. Cuba. In good condition.

mexicana (Astata), Proc. Ent. Sec. A. N. S., 1881, v, ♂.
1998. Mexico. In good condition.
montana (Astata), Proc. Ent. Sec. A. N. S., 1881, v, ♀.
1994. Nevada. In good condition.
montana (Larrada), Proc. Ent. Soc. Phil., iv, 465, ♀.
2015. Colorado. In good condition.
nevadica (Astata), Proc. Ent. Sec. A. N. S., 1881, v, ♀.
1992. Nevada. Right antenna off beyond joint three.
nigropilosa (Astata), Proc. Ent. Sec. A. N. S., 1881, iv, ♀ ♂.
1991 ♀. Colorado. Left antenna off.
nubecula (Astata), Proc. Ent. Soc. Phil., iv, 466, ♂.
1990. Colorado. In good condition.
obscurus (Tachytes), Trans. Am. Ent. Soc., iv, 217, ♀.
2009. Texas. In good condition.
occidentalis (Astata), Proc. Ent. Sec. A. N. S., 1881, iii, ♂.
1989. Washington Territory. In good condition.
parvula (Larrada), Proc. Ent. Soc. Phil., iv, 465, ♂.
2014. Colorado. In good condition.
rufiventris (Astata), Trans. Am. Ent. Soc., iv, 218, ♀.
Texas. In Belfrage Collection; type No. 1693, U. S. N. M. "Condition good."
rufofasciata (Tachytes), Trans. Am. Ent. Soc., iv, 217, ♂.
Texas. In Belfrage Collection; type No. 1433, U. S. N. M. "Condition good."
semirufa (Larrada), Proc. Ent. Soc. Phil., iv, 464, ♀.
2013. Colorado. In good condition.
sericatus (Tachytes), Trans. Am. Ent. Soc., iv, 216, ♀ ♂.
2007 ♀. Texas. In good condition.
terminata (Astata), Trans. Am. Ent. Soc., iv, 218, ♂.
Texas. In Belfrage Collection; type No. 1694, U. S. N. M. "No head."
texana (Larrada), Trans. Am. Ent. Soc., iv, 214, ♀ ♂.
2012 ♀. Texas. In good condition.
texanus (Tachytes), Trans. Am. Ent. Soc., iv, 217, ♂.
2010. Texas. In good condition.
validus (Tachytes), Trans. Am. Ent. Soc., iv, 216, ♀ ♂.
2003 ♀. Texas. In good condition.
vinulenta (Larrada), Proc. Ent. Soc. Phil., iv, 138.
2001. Cuba. In good condition.

BEMBECIDAE

argentifrons (Bembex), Proc. Ent. Soc. Phil., iv, 141, ♀ ♂.
2059 ♀. Cuba. In good condition.
armata (Bembex), Proc. Ent. Soc. Phil., iv, 142, ♀ ♂.
2060 ♀. Cuba. In good condition.

belfragei (Bembex), Trans. Am. Ent. Soc., iv, 220, ♂.
2055. Texas. In good condition.
emarginata (Monedula), Proc. Ent. Soc. Phil., iv, 468, ♀ ♂.
2063 ♀. Colorado. In good condition.
fervidus (Stizus), Trans. Am. Ent. Soc., iv, 223, ♀.
2050. Texas. In good condition.
formosa (Monedula), Trans. Am. Ent. Soc., iv, 221, ♀ ♂.
2064 ♀. Texas. In good condition.
neglecta (Monedula), Trans. Am. Ent. Soc., iv, 222, ♀.
2053. Comal County, Texas. In good condition.
nevadensis (Stizus), Trans. Am. Ent. Soc., v, 99; Report Wheeler Expl., pl. 33, fig. 1, ♂.
2051. Nevada. In good condition.
nubilipennis (Bembex), Trans. Am. Ent. Soc., iv, 218, ♀ ♂.
2058 ♀. Texas. In good condition.
obliqua (Monedula), Proc. Ent. Soc. Phil., iv, 469, ♀.
2065. Colorado. In good condition.
pulchella (Monedula), Proc. Ent. Soc. Phil., iv, 471, ♀ ♂.
2062 ♀. Colorado. In good condition.
sayi (Bembex), Proc. Ent. Soc. Phil., iv, 467, ♀.
2056. Colorado. In good condition.
speciosa (Monedula), Proc. Ent. Soc. Phil., iv, 470, ♀.
2061. Colorado. In good condition.
texana (Bembex), Trans. Am. Ent. Soc., iv, 219, ♀.
2057. Texas. In good condition.
texanus (Stizus), Trans. Am. Ent. Soc., iv, 222, ♂ ♀.
2054 ♂. Texas. In good condition.

NYSSONIDAE

abdominalis (Gorytes), Proc. Ent. Soc. Phil., iv, 474, ♀ ♂.
2024 ♀. Colorado. In good condition.
aculeatus (Alyson), Proc. Ent. Soc. Phil., iv, 148, ♂.
Cuba. In Gundlach Collection.
albomarginatus (Nysson), Trans. Am. Ent. Soc., ix, 278, ♀ ♂.
2042 ♀. Nevada. In good condition.
armatus (Nysson), Proc. Ent. Soc. Phil., iv, 145, ♀ ♂.
2040 ♀. Cuba. Tip of right antenna and right posterior leg, off.
aztecus (Nysson), Trans. Am. Ent. Soc., ix, 279, ♀.
2751. Mexico. Antennae broken.
basilaris (Nysson), Trans. Am. Ent. Soc., ix, 281, ♀.
2034. Georgia. In good condition.

belfragei (Gorytes), Trans. Am. Ent. Soc., iv, 224, ♀.
Texas. In Belfrage Collection; type No. 1710, U. S. N. M. "Left antenna beyond third joint gone."

bellus (Nysson), Trans. Am. Ent. Soc., ix, 280, ♀.
2035. Montana. In good condition.

bicolor (Hyponysson), Trans. Am. Ent. Soc., ix, 284, ♀.
2038. Washington Territory. Wings off.

bollii (Gorytes), Trans. Am. Ent. Soc., iv, 225, ♀.
Texas. In Coll. Mus. Comp. Zool.; type No. 491. In good condition.

compactus (Nysson), Trans. Am. Ent. Soc., ix, 278, ♀ ♂.
2028 ♀. Washington Territory. In good condition.

costalis (Gorytes), Trans. Am. Ent. Soc., iv, 225, ♀.
Texas. In Coll. Mus. Comp. Zool.; type No. 489. In good condition.

fidelis (Nysson), Trans. Am. Ent. Soc., ix, 282, ♀ ♂.
2032 ♀. Montana. In good condition.

fuscipes (Paranysson), Trans. Am. Ent. Soc., ix, 274, ♀ ♂.
2026 ♀. Washington Territory. In good condition.

inerme (Nysson?), Trans. Am. Ent. Soc., iv, 224, ♀.
Texas. In Belfrage Collection; type No. 1714, U. S. N. M. "Head and anterior part of thorax gone."

insularis (Harpactus), Proc. Ent. Soc. Phil., iv, 146, ♀.
Cuba. In Gundlach Collection.

mellipes (Nysson), Trans. Am. Ent. Soc., ix, 279, ♀ ♂.
2033 ♀. Colorado. In good condition.

mexicanus (Paranysson), Trans. Am. Ent. Soc., ix, 275, ♀ ♂.
2041 ♀. Mexico. In good condition.

modestus (Gorytes), Proc. Ent. Soc. Phil., iv, 473, ♂.
2025. Colorado. In good condition.

moestus (Nysson), Trans. Am. Ent. Soc., ix, 280, ♂.
2037. Washington Territory. Left anterior wing more or less broken.

plagiatus (Nysson), Trans. Am. Ent. Soc., ix, 276, ♀ ♂.
2750 ♀. Illinois. Tips of posterior tarsi off.

propinquus (Gorytes), Trans. Am. Ent. Soc., i, 379, ♀.
2023. New Mexico. In good condition.

pumilus (Nysson), Trans. Am. Ent. Soc., ix, 283, ♂.
2036. Nevada. Head and right wings off.

rufiventris (Nysson), Trans. Am. Ent. Soc., ix, 283, ♀.
2031. Montana. In good condition.

rusticus (Nysson), Trans. Am. Ent. Soc., ix, 282, ♀ ♂.
2030 ♀. Washington Territory. In good condition.

scitulus (Harpactus), Proc. Ent. Soc. Phil., iv, 147, ♀.
Cuba. In Gundlach Collection.

smithii (Gorytes), Proc. Ent. Sec. A. N. S., 1880, xviii, ♀.
2022. Illinois. In good condition.

texanus (Alyson), Trans. Am. Ent. Soc., iv, 226, ♂.
Texas. In Belfrage Collection; type No. 1712, U. S. N. M. "Flagellums wanting beyond second joint; left wings wanting."
texanus (Nysson), Trans. Am. Ent. Soc., iv, 223, ♀.
2027. Texas. In good condition.
tricolor (Gorytes), Trans. Am. Ent. Soc., i, 380, ♀.
2020. New Mexico. In good condition.
tristis (Nysson), Trans. Am. Ent. Soc., ix, 281, ♂.
2029. Washington Territory. In good condition.
venustus (Gorytes), Proc. Ent. Soc. Phil., iv, 472, ♀ ♂.
2021 ♀. Colorado. In good condition.
zapotecus (Nysson), Trans. Am. Ent. Soc., ix, 280, ♀.
2039. Mexico. In good condition.

PHILANTHIDAE

albifrons (Philanthus), Proc. Ent. Soc. Phil., v, 101, ♀ ♂.
1973 ♀. Colorado. In good condition.
albopilosus (Philanthus), Proc. Ent. Soc. Phil., v, 91, ♂.
1970. Illinois. In good condition.
basilaris (Philanthus), Proc. Ent. Sec. A. N. S., 1879, xxxiii, ♀ ♂.
1974 ♀. Colorado. In good condition.
bicolor (Eucerceris), Proc. Ent. Sec. A. N. S., 1881, xxxviii, ♀.
1959. Montana. In good condition.
bilunata (Cerceris), Proc. Ent. Soc. Phil., iv, 155, ♂.
1957. Cuba. Right posterior leg off.
bilunatus (Philanthus), Proc. Ent. Soc. Phil., v, 97, ♂.
1986. Illinois. In good condition.
biungulata (Cerceris), Proc. Ent. Soc. Phil., v, 118, ♀.
1956. Colorado. In good condition.
blakei (Cerceris), Proc. Ent. Soc. Phil., v, 121, ♀.
1947. Georgia. In good condition.
californica (Cerceris), Proc. Ent. Soc. Phil., v, 128, ♂.
1953. California. In good condition.
californicus (Philanthus), Proc. Ent. Sec. A. N. S., 1879, xxxii, ♂.
1975. California. In good condition.
cingulatus (Eucerceris), Proc. Ent. Soc. Phil., v, 110, ♂.
1964. Colorado. Wings frayed.
compacta (Cerceris), Proc. Ent. Soc. Phil., v, 127, ♀ ♂.
1940 ♀. Illinois. In good condition.
compar (Cerceris), Proc. Ent. Soc. Phil., v, 126, ♂.
1949. Illinois. In good condition.
cubensis (Cerceris), Proc. Ent. Soc. Phil., v, 123.
See *zonata* || Cresson.

dentifrons (Cerceris), Proc. Ent. Soc. Phil., v, 124, ♀.
1942. Illinois. In good condition.
dubius (Philanthus), Proc. Ent. Soc. Phil., v, 96, ♂.
1985. Illinois. In good condition.
elegans (Eucerceris), Proc. Ent. Sec. A. N. S., 1879, xxiii, ♂.
1968. Nevada. In good condition.
fasciola (Cerceris), Trans. Am. Ent. Soc., iv, 230, ♂.
1950. Comal County, Texas. In good condition.
festiva (Cerceris), Proc. Ent. Soc. Phil., iv, 156, ♂.
Cuba. In Gundlach Collection.
finitima (Cerceris), Proc. Ent. Soc. Phil., v. 122, ♀.
1948. Illinois. Left antenna broken.
firma (Cerceris), Trans. Am. Ent. Soc., iv, 229, ♀.
1945. Texas. In good condition.
flavifrons (Philanthus), Proc. Ent. Soc. Phil., v, 102, ♀.
1972. Colorado. In good condition.
flavocinctus (Eucerceris), Proc. Ent. Soc. Phil., v, 109, ♀.
1963. Colorado. In good condition.
flavocostalis (Cerceris), Proc. Ent. Soc. Phil., iv, 153, ♀ ♂.
Cuba. In Gundlach Collection.
frontalis (Philanthus), Proc. Ent. Soc. Phil., v, 99, ♂.
1976. Colorado. In good condition.
fulviceps (Eucerceris), Proc. Ent. Sec. A. N. S., 1879, xxiii, ♀.
1960. New Mexico. In good condition.
fulvipes (Cerceris), Proc. Ent. Soc. Phil., v, 126, ♀.
1941. Delaware. In good condition.
fulvipes (Eucerceris), Proc. Ent. Soc. Phil., v, 111, ♀ ♂.
1966 ♀. Colorado. In good condition.
gloriosus (Philanthus), Proc. Ent. Soc. Phil., v, 86, ♀.
1978. Colorado. In good condition.
gnara (Cerceris), Trans. Am. Ent. Soc., iv, 229, ♂.
1938. Texas. In good condition.
imitator (Cerceris), Proc. Ent. Soc. Phil., v, 125, ♂.
1951. Illinois. In good condition.
insolita (Cerceris), Proc. Ent. Soc. Phil., v, 129, ♂.
1954. Illinois. In good condition.
jucunda (Cerceris), Trans. Am. Ent. Soc., iv, 231, ♂.
Texas. In Belfrage Collection; type No. 1716, U. S. N. M. "Condition good."
kennicottii (Cerceris), Proc. Ent. Soc. Phil., v, 128, ♂.
1952. Louisiana. In good condition.
laticeps (Eucerceris), Proc. Ent. Soc. Phil., v, 107, ♀ ♂.
1962 ♀. Massachusetts. In good condition.
laticinctus (Philanthus), Proc. Ent. Soc. Phil., v, 91, ♂.
1971. Colorado. In good condition.

lepidus (Philanthus), Proc. Ent. Soc. Phil., v, 92, ♂.
1979. Colorado. In good condition.
mimica (Cerceris), Trans. Am. Ent. Soc., iv, 228, ♀ ♂.
1943 ♀. Texas. In good condition.
montanus (Eucerceris), Proc. Ent. Sec. A. N. S., 1882, viii, ♀ ♂.
1946 ♀. Montana. In good condition.
morata (Cerceris), Trans. Am. Ent. Soc., iv, 230, ♀.
1944. Texas. In good condition.
pacificus (Philanthus), Proc. Ent. Sec. A. N. S., 1879, xxxii, ♂.
1980. Nevada. In good condition.
pulchellus (Philanthus), Proc. Ent. Soc. Phil., v, 93, ♂.
1981. Colorado. In good condition.
rubripes (Eucerceris), Proc. Ent. Sec. A. N. S., 1879, xxiii, ♂.
1961. Colorado. In good condition.
rufinoda (Cerceris), Proc. Ent. Soc. Phil., v, 121, ♂.
1955. Colorado. In good condition.
sanbornii (Philanthus), Proc. Ent. Soc. Phil., v, 89, ♀ ♂.
1982 ♀. Massachusetts. In good condition.
scelestus (Philanthus), Proc. Ent. Sec. A. N. S., 1879, xxxiii, ♀.
1987. Colorado. In good condition.
scutellaris (Philanthus), Proc. Ent. Sec. A. N. S., 1879, xxxiv, ♂.
1983. Kansas. In good condition.
similis (Eucerceris), Proc. Ent. Sec. A. N. S., 1879, xxiv, ♀ ♂.
1965 ♀. Nevada. In good condition.
simillimus (Philanthus), Proc. Ent. Soc. Phil., v, 95, ♀.
1988. Illinois. In good condition.
sublimis (Philanthus), Proc. Ent. Sec. A. N. S., 1879, xxxii, ♂.
1977. Colorado. In good condition.
superbus (Eucerceris), Proc. Ent. Soc. Phil., v, 108, ♂.
1967. Colorado. In good condition.
triangulata (Cerceris), Proc. Ent. Soc. Phil., iv, 154, ♀.
Cuba. In Gundlach Collection.
venator (Cerceris), Proc. Ent. Soc. Phil., v, 116, ♂.
1937. Illinois. In good condition.
vicina (Cerceris), Proc. Ent. Soc. Phil., v, 120, ♀.
1939. Colorado. In good condition.
vittatifrons (Eucerceris), Proc. Ent. Sec. A. N. S., 1879, xxiv, ♂.
1969. Nevada. In good condition.
zebratus (Philanthus), Proc. Ent. Sec. A. N. S., 1879, xxxiii, ♂.
1984. Nevada. In good condition.
zonata (Cerceris), Proc. Ent. Soc. Phil., iv, 156, ♀ ♂.
1958 ♀. Cuba. In good condition. Name preoccupied; renamed *cubensis* Cresson.

MIMESIDAE

argentifrons (Mimesa), Proc. Ent. Soc. Phil., iv, 487, ♀ ♂.
2045 ♀. Colorado. Left posterior leg off beyond coxa.
argentifrons (Psen), Proc. Ent. Soc. Phil., iv, 152, ♀ ♂.
Cuba. In Gundlach Collection.
proxima (Mimesa), Proc. Ent. Soc. Phil., iv, 488, ♀.
2047. Colorado. In good condition.
tibialis (Mimesa), Trans. Am. Ent. Soc., iv, 227, ♂ ♀.
2048 ♀. Texas. In good condition.
unicincta (Mimesa), Proc. Ent. Soc. Phil., iv, 488, ♀.
2046. Colorado. Left upper wing off; condition fair.

MELLINIDAE

abdominalis (Mellinus), Proc. Ent. Sec. A. N. S., 1881, xxxix, ♀ ♂.
2019 ♀. Montana. In good condition.
rufinodus (Mellinus), Proc. Ent. Soc. Phil., iv, 475, ♀ ♂.
2018 ♀. Colorado. In good condition.

PEMPHREDONIDAE

mandibularis (Pemphredon), Proc. Ent. Soc. Phil., iv, 487, ♀.
2044. Colorado. In good condition.
morio (Pemphredon), Proc. Ent. Soc. Phil., iv, 486, ♀.
2043. Colorado. Head off.

CRABRONIDAE

analis (Oxybelus), Proc. Ent. Soc. Phil., iv, 149, ♀ ♂.
1917 ♀. Cuba. In good condition.
ater (Crabro), Proc. Ent. Soc. Phil., iv, 477, ♀.
1911. Colorado. In good condition.
atriceps (Crabro), Proc. Ent. Soc. Phil., iv, 483, ♀.
1902. Colorado. In good condition.
atrifrons (Crabro), Proc. Ent. Soc. Phil., iv, 483, ♂.
1913. Colorado. First segment of abdomen crushed.
auriceps (Crabro), Proc. Ent. Soc. Phil., iv, 150, ♂.
1912. Cuba. In good condition.
bellus (Crabro), Proc. Ent. Soc. Phil., iv, 481, ♀.
1897. Colorado. In good condition.
claviventris (Crabro), Proc. Ent. Soc. Phil., iv, 151, ♂.
Cuba. In Gundlach Collection.

conspicuus (Crabro), Proc. Ent. Soc. Phil., iv, 480, ♀.
1903. Colorado. In good condition.
contiguus (Crabro), Proc. Ent. Soc. Phil., iv, 484, ♀.
1901. Colorado. In good condition.
cubensis (Crabro), Proc. Ent. Soc. Phil., iv, 152, ♀.
1898. Cuba. In good condition.
dilectus (Crabro), Proc. Ent. Soc. Phil., iv, 478, ♀ ♂.
1909 ♀. Colorado. In good condition
honestus (Crabro), Proc. Ent. Soc. Phil., iv, 485, ♀.
1908. Colorado. In good condition.
interruptus (Oxybelus), Proc. Ent. Soc. Phil., iv, 475, ♀.
1915. Colorado. In good condition.
montanus (Crabro), Proc. Ent. Soc. Phil., iv, 484, ♀.
1899. Colorado. In good condition.
nigrifrons (Crabro), Proc. Ent. Soc. Phil., iv, 482, ♂.
1900. Colorado. In good condition.
odyneroides (Crabro), Proc. Ent. Soc. Phil., iv, 481, ♂.
1907. Colorado. In good condition.
packardii (Crabro), Proc. Ent. Soc. Phil., iv, 477, ♀ ♂.
1906 ♀. Colorado. In good condition.
parvus (Oxybelus), Proc. Ent. Soc. Phil., iv, 476, ♀.
1916. Colorado. In good condition.
similis (Oxybelus), Proc. Ent. Soc. Phil., iv, 476, ♀.
1914. Colorado. In good condition.
succinctum (Trypoxylon), Proc. Ent. Soc. Phil., iv, 149, ♀.
Cuba. In Gundlach Collection.
succinctus (Crabro), Proc. Ent. Soc. Phil., iv, 479, ♀.
1904. Colorado. In good condition.
texanus (Crabro), Trans. Am. Ent. Soc., iv, 227, ♀.
1905. Texas. In good condition.
texanus (Entomognathus), Syn. Hymen, 1887, 286, ♀ ♂.
1896 ♀. Texas. In good condition.
vicinus (Crabro), Proc. Ent. Soc. Phil., iv, 479, ♀.
1910. Colorado. In good condition.

EUMENIDAE

apicalis (Odynerus), Proc. Ent. Soc. Phil., iv, 161, ♀ ♂.
2078 ♂. Cuba. In good condition. The female in the Gundlach Collection.
austrinus (Odynerus), Trans. Am. Ent. Soc., iv, 243, ♂ ♀.
2081 ♀. Texas. In good condition.
belfragei (Eumenes), Trans. Am. Ent. Soc., iv, 232, ♀ ♂.
2067 ♀. Texas. In good condition.

bellulus (Odynerus), Trans. Am. Ent. Soc., iv, 243, ♀.
2085. Texas. In good condition.
biplagiatus (Pterochilus), Proc. Ent. Sec. A. N. S., 1879, xix, ♀ ♂.
2093 ♀. California. Left antenna off beyond joint three.
bollii (Eumenes), Trans. Am. Ent. Soc., iv, 232, ♀ ♂.
2066 ♀. Texas. In good condition.
cingulatus (Odynerus), Proc. Ent. Soc. Phil., iv, 162, ♀.
Cuba. In Gundlach Collection.
clusinus (Odynerus), Trans. Am. Ent. Soc., iv, 234, ♀ ♂.
2730 ♀. Texas. In good condition.
colon (Odynerus), Trans. Am. Ent. Soc., iv, 241, ♀ ♂.
2080 ♀. Texas. In good condition.
coloradensis (Eumenes), Report Wheeler Expl., 1875, 717, ♀ ♂.
2728 ♀. Colorado. Tip of right antenna off.
comptus (Pterochilus), Proc. Ent. Sec. A. N. S., 1879, xviii, ♀.
2091. Nevada. In good condition.
consors (Odynerus), Proc. Ent. Soc. Phil., iv, 160, ♂.
2073. Cuba. In good condition.
cubensis (Eumenes), Proc. Ent. Soc. Phil., iv, 157, ♀.
Cuba. In Gundlach Collection.
cultus (Odynerus), Trans. Am. Ent. Soc., iv, 236, ♂.
2072. Comal County, Texas. In good condition.
decorus (Pterochilus), Proc. Ent. Sec. A. N. S., 1879, xviii, ♀.
2089. Nevada. In good condition.
dejectus (Odynerus), Proc. Ent. Soc. Phil., iv, 164, ♀.
Cuba. In Gundlach Collection.
delicatus (Odynerus), Trans. Am. Ent. Soc., iv, 236, ♀.
2077. Comal County, Texas. Condition fairly good.
designatus (Odynerus), Trans. Am. Ent. Soc., iv, 235, ♀.
Texas. In Belfrage Collection; type No. 1731, U. S. N. M. "Head gone."
ductus (Odynerus), Trans. Am. Ent. Soc., iv, 238, ♀ ♂.
2070 ♀. Texas. In good condition.
electus (Odynerus), Trans. Am. Ent. Soc., iv, 243, ♂.
Texas. In Belfrage Collection; type No. 1783, U. S. N. M. "Condition good."
evectus (Odynerus), Trans. Am. Ent. Soc., iv, 235, ♀.
2071. Texas. In good condition.
ferruginea (Eumenes), Proc. Ent. Soc. Phil., iv, 158, ♂.
Cuba. In Gundlach Collection.
firmus (Odynerus), Trans. Am. Ent. Soc., iv, 239, ♀ ♂.
2076 ♀. Texas. In good condition.
fundatus (Odynerus), Trans. Am. Ent. Soc., iv, 242, ♀ ♂.
2082 ♀. Texas. In good condition.
fusus (Odynerus), Trans. Am. Ent. Soc., iv, 238, ♀ ♂.
2069 ♀. Texas. In good condition.

geminus (Odynerus), Trans. Am. Ent. Soc., iv, 240, ♀.
2074. Texas. Abdomen detached.
laticeps (Pterochilus), Trans. Am. Ent. Soc., iv, 244, ♀ ♂.
2090 ♀. Texas. In good condition.
lewisii (Pterochilus), Trans. Am. Ent. Soc., i, 382, ♀.
2087. New Mexico. In good condition.
manifestus (Odynerus), Trans. Am. Ent. Soc., iv, 241, ♂ ♀.
2079 ♀. Texas. In good condition.
mirandus (Pterochilus), Proc. Ent. Sec. A. N. S., 1879, xvii, ♀ ♂.
2086 ♀. Nevada. In good condition.
morrisoni (Pterochilus), Proc. Ent. Sec. A. N. S., 1879, xix, ♀ ♂.
2092 ♀. Nevada. In good condition.
obliquus (Odynerus), Proc. Ent. Soc. Phil., iv, 163, ♀ ♂.
2068 ♀. Cuba. In good condition.
proetus (Odynerus), Proc. Ent. Soc. Phil., iv, 159, ♀.
Cuba. In Gundlach Collection.
rufinodus (Odynerus), Trans. Am. Ent. Soc., i, 381, ♀.
2084. New Mexico. In good condition.
texanus (Odynerus), Trans. Am. Ent. Soc., iv, 234, ♀.
Texas. In Belfrage Collection; type No. 1740, U. S. N. M. "Hole eaten in thorax."
texanus (Pterochilus), Trans. Am. Ent. Soc., iv, 244, ♀.
2795. Texas. In good condition. Type returned by Belfrage.
toas (Odynerus), Trans. Am. Ent. Soc., i, 381, ♀ ♂.
2083 ♀. New Mexico. In good condition.
verus (Odynerus), Trans. Am. Ent. Soc., iv, 237, ♀ ♂.
2075 ♀. Texas. In good condition.
zonatus (Pterochilus), Proc. Ent. Sec. A. N. S., 1879, xviii, ♂.
2088. Nevada. Abdomen detached.

MASARIDAE

edwardsii (Masaris), Trans. Am. Ent. Soc., iv, 87, ♀ ♂.
2096 ♂. California. In good condition.
marginalis (Masaris), Proc. Ent. Soc. Phil., iii, 677, ♀.
2097. Colorado. In good condition.
occidentalis (Masaris), Trans. Am. Ent. Soc., iii, 348, ♀; iv, 231, ♂.
2098 ♀. Texas. In good condition.
scutellaris (Euparagia), Proc. Ent. Sec. A. N. S., 1879, vi, ♀ ♂.
2094 ♀. Nevada. Right antenna off.
texanus (Masaris), Trans. Am. Ent. Soc., iii, 348, ♂ ♀.
2100 ♂. Texas. In good condition.

vespoides (Masaris), Proc. Ent. Soc. Phil., ii, 69–74, pl. iv, ♂ ♀.
2095 ♂. Pike's Peak, Colorado. In good condition.
zonalis (Masaris), Proc. Ent. Soc. Phil., iii, 674, ♀ ♂.
2099 ♂. Colorado. In good condition.

VESPIDAE

bellicosus (Polistes), Trans. Am. Ent. Soc., iv, 247, ♂ ♀.
2104 ♀. Texas. In good condition.
flavus (Polistes), Trans. Am. Ent. Soc., i, 383, ♀.
2102. New Mexico. In good condition.
generosus (Polistes), Trans. Am. Ent. Soc., iv, 246, ♂.
2107. Texas. In good condition.
incertus (Polistes), Proc. Ent. Soc. Phil., iv, 166, ♂.
2105. Cuba. Left antenna and right posterior leg, off.
navajoe (Polistes), Trans. Am. Ent. Soc., i, 383, ♀.
2101. New Mexico. Left anterior wing detached.
occidentalis (Vespa), Trans. Am. Ent. Soc., v, 100; Report Wheeler Expl., pl. 34, figs 1–2, ♀ ☿.
2109 ♀. Nevada. In good condition.
perplexus (Polistes), Trans. Am. Ent. Soc., iv, 245, ♂.
2106. Texas. In good condition.
texanus (Polistes), Trans. Am. Ent. Soc., iv, 246, ♀ ♂.
2108 ♀. Texas. In good condition.
variatus (Polistes), Trans. Am. Ent. Soc., iv, 247, ♀ ♂.
2103 ♀. Texas. In good condition.

ANDRENIDAE

aethiops (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 169, ♀.
2154. Orizaba, Mexico. In good condition.
albescens (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 168, ♀.
2150. Illinois. In good condition.
albitarsis (Halictus), Trans. Am. Ent. Soc., iv, 254, ♂.
2119. Texas. In good condition.
americana (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 167, ♀ ♂.
2145 ♀. Illinois. In good condition.
antennata (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 271, ♂.
2127. New Jersey. Right antenna off.
apacha (Nomia?), Trans. Am. Ent. Soc., i, 386, ♀.
2139. New Mexico. In good condition.
armaticeps (Halictus), Trans. Am. Ent. Soc., iv, 250, ♀ ♂.
2725 ♀. Texas. In good condition.
azteca (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 169, ♀.
2153. Orizaba, Mexico. In good condition.

azteca (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 272, ♀.
2131. Orizaba, Mexico. In good condition.
bardus (Halictus), Trans. Am. Ent. Soc., iv, 251, ♀.
2116. Texas. In good condition.
belfragei (Andrena), Trans. Am. Ent. Soc., iv, 256, ♀.
Texas. In Belfrage Collection; type No. 1753, U. S. N. M. "Antenna (right) wanting beyond third."
bipunctata (Andrena), Trans. Am. Ent. Soc., iv, 259, ♂.
Texas. Not found. A specimen in Belfrage Collection, U. S. N. M., marked "Type No. 1440; condition good."
brunniventris (Andrena), Trans. Am. Ent. Soc., iv, 258, ♂.
Texas. Belfrage Collection. "Not found."
canadensis (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 166, ♂.
2147. Canada West. In good condition.
coactus (Halictus), Trans. Am. Ent. Soc., iv, 254, ♀.
2123. Texas. In good condition.
compacta (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 166, ♀ ♂.
2144 ♀. Illinois. In good condition.
connexus (Halictus), Trans. Am. Ent. Soc., iv, 253, ♀.
2121. Texas. In good condition.
consors (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 168, ♂.
2149. Colorado. In good condition.
disparilis (Halictus), Trans. Am. Ent. Soc., iv, 253, ♀.
2120. Texas. In good condition.
distincta (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 167, ♂.
2152. Georgia. In good condition.
dubiosa (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 272, ♂.
2132. Orizaba, Mexico. In good condition.
electa (Megacilissa), Proc. Acad. Nat. Sci. Phil., 1878, 221, ♂.
2140. Georgia. In good condition.
elegans (Augochlora), Proc. Ent. Soc. Phil., iv, 169, ♂.
2724. Cuba. In good condition.
festivus (Agapostemon), Proc. Ent. Soc. Phil., iv, 172, ♂.
2789. Cuba. In good condition.
grossa (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 273, ♂.
2129. Orizaba, Mexico. Abdomen off beyond first segment.
imitatrix (Andrena), Trans. Am. Ent. Soc., iv, 258, ♀.
2727. Texas. In good condition.
impurus (Halictus), Trans. Am. Ent. Soc., iv, 252, ♀.
2114. Texas. In good condition.
limbifrons (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 273, ♀.
Cuba. In Gundlach Collection.
lusorius (Halictus), Trans. Am. Ent. Soc., iv, 252, ♀.
2115. Texas. In good condition.

magnifica (Augochlora), Proc. Ent. Soc. Phil., iv, 170, ♂.
Cuba. In Gundlach Collection.

mandibularis (Sphecodes), Trans. Am. Ent. Soc. iv, 250, ♀.
2133. Texas. In good condition.

marginipennis (Eunomia), Report Wheeler Expl., 1875, 722, ♀ ♂.
2138 ♂. Colorado. In good condition.

mellea (Andrena), Trans. Am. Ent. Soc., i, 384, ♀.
2163. New Mexico. Left antenna and left anterior wing off.

melliventris (Agapostemon), Trans. Am. Ent. Soc., v, 101; Report Wheeler Expl., pl. 33, fig. 4, ♀.
2112. Nevada. In good condition.

melliventris (Andrena), Trans. Am. Ent. Soc., iv, 257, ♀.
Texas. In Belfrage Collection; type No. 1755, U. S. N. M. "Left antenna gone and right beyond pedicel."

mexicana (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 170, ♀ ♂.
2156 ♀. Orizaba, Mexico. In good condition.

mexicana (Megacilissa), Proc. Acad. Nat. Sci. Phil., 1878, 221, ♀.
2142. Mexico. In good condition.

mexicana (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 272, ♀ ♂.
2130 ♀. Orizaba, Mexico. In good condition.

miserabilis (Andrena), Trans. Am. Ent. Soc., iv, 259, ♀ ♂.
2160 ♀. Texas. Left antenna off.

nevadensis (Nomia), Trans. Am. Ent. Soc., v, 101; Report Wheeler Expl., pl. 34, fig. 3–4, ♀ ♂.
2137 ♀. Nevada. Pubescence matted.

nigrescens (Megacilissa?), Trans. Am. Ent. Soc., ii, 295, ♂.
Cuba. In Gundlach Collection.

nortoni (Nomia), Trans. Am. Ent. Soc., i, 385, ♀ ♂.
2135 ♀. New Mexico. In good condition.

obscurata (Agapostemon), Trans. Am. Ent. Soc., ii, 295, ♂.
2790. Cuba. In good condition.

occidentalis (Halictus), Trans. Am. Ent. Soc., iv, 250, ♀ ♂.
2117 ♀. Texas. In good condition.

ornatipes (Halictus), Trans. Am. Ent. Soc., iv, 252, ♂.
2118. Texas. In good condition.

parva (Augochlora), Proc. Ent. Soc. Phil., iv, 171, ♀ ♂.
2791 ♀. Cuba. Left antenna incomplete.

permitis (Andrena), Trans. Am. Ent. Soc., iv, 257, ♀.
2158. Texas. Left antenna broken; pubescence matted.

praeclara (Augochlora), Proc. Ent. Soc. Phil., iv, 169, ♀.
2723. Cuba. In good condition.

propinqua (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 165, ♀ ♂.
2146 ♀. Massachusetts. In good condition.

punctipennis (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 169, ♀.
2155. Orizaba, Mexico. In good condition.
pygmaea (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 272, ♂.
2128. Illinois. In good condition.
reflexa (Andrena), Trans. Am. Ent. Soc., iv, 256, ♂.
2159. Texas. In good condition.
robinsoni (Nomia), Proc. Ent. Soc. Phil., iv, 174, ♀ ♂.
2136 ♂. Cuba. In good condition.
semiviridis (Agapostemon), Proc. Ent. Soc. Phil., iv, 172, ♀.
2788. Cuba. In good condition.
simulans (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 168, ♂.
2148. Colorado. In good condition.
sparsa (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 271, ♀.
2126. Pennsylvania. Abdomen and hind legs off.
stultus (Halictus), Trans. Am. Ent. Soc., iv, 254, ♀.
2113. Texas. In good condition.
subaurata (Megacilissa?), Trans. Am. Ent. Soc., ii, 296, ♂.
Cuba. In Gundlach Collection.
submarginata (Colletes), Proc. Ent. Soc. Phil., iv, 167, ♀.
2157 ♀. Cuba. In good condition.
texana (Andrena), Trans. Am. Ent. Soc., iv, 258, ♂.
2796. Texas. In good condition.
texana (Colletes), Trans. Am. Ent. Soc., iv, 249, ♀.
2151. Comal County, Texas. In good condition.
texana (Sphecodes), Trans. Am. Ent. Soc., iv, 249, ♀ ♂.
2134 ♀. Texas. In good condition.
texanus (Agapostemon), Trans. Am. Ent. Soc., iv, 255, ♀.
2111. Texas. In good condition.
texanus (Halictus), Trans. Am. Ent. Soc., iv, 251, ♀ ♂.
Texas. Belfrage Collection. Not found.
trizonatus (Halictus), Trans. Am. Ent. Soc., v, 101; Report Wheeler, Expl., 1875, pl. 33, fig. 3, ♀.
Nevada. Not found.
valida (Colletes), Proc. Bost. Soc. Nat. Hist., xii, 165, ♀ ♂.
2143 ♀. Massachusetts. In good condition.
varifrons (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 270, ♀.
2124. Colorado. In good condition.
verecunda (Andrena), Trans. Am. Ent. Soc., iv, 257, ♀.
2162. Texas. In good condition.
verticalis (Prosopis), Proc. Bost. Soc. Nat. Hist., xii, 271, ♂.
2125. Colorado. In good condition.
yarrowi (Megacilissa), Report Wheeler Expl., 1875, 723, ♀.
2141. New Mexico. Pubescence matted.

APIDAE

abacula (Megachile), Trans. Am. Ent. Soc., vii, 130, ♀ ♂.
2437 ♀. Mexico. In good condition.

abdominalis (Calliopsis), Trans. Am. Ent. Soc., vii, 68, ♀ ♂.
2200 ♀. Texas. In good condition.

abdominalis (Tetrapedia), Proc. Acad. Nat. Sci. Phil., 1878, 182, ♀ ♂.
2381 ♂. Mexico. In good condition.

abjecta (Osmia), Trans. Am. Ent. Soc., vii, 103, ♀.
2521. Colorado. In good condition.

abnormis (Osmia), Trans. Am. Ent. Soc., vii, 105, ♂.
2546. Colorado. Extreme tip of left antenna, and apical half of right antenna, off.

accepta (Nomada), Trans. Am. Ent. Soc., vii, 77, ♀ ♂.
2610 ♀. Colorado. In good condition.

acerba (Melissodes), Trans. Am. Ent. Soc., vii, 210, ♀.
2351. Nevada. In good condition.

actuosa (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 208, ♀.
2320. California. Tip of right posterior tarsus off.

addenda (Megachile), Trans. Am. Ent. Soc., vii, 124, ♀ ♂.
2418 ♀. Georgia. In good condition.

adducta (Nomada), Trans. Am. Ent. Soc., vii, 73, ♂.
2591. Colorado. In good condition.

aethiops (Centris), Proc. Ent. Soc. Phil., iv, 193, ♀.
2623. Cuba. In good condition.

aethiops (Panurgus), Trans. Am. Ent. Soc., iv, 259, ♀ ♂.
2202 ♀. Texas. In good condition.

affabilis (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 189, ♀ ♂.
2266 ♀. Texas. In good condition.

affabilis (Nomada), Trans. Am. Ent. Soc., vii, 74, ♂.
2593. New York. Flagellum of left antenna and tips of posterior tarsi off.

affinis (Bombus), Proc. Ent. Soc. Phil., ii, 103, ♀ ♂.
2631 ♀. Canada. In good condition.

affinis (Perdita), Trans. Am. Ent. Soc., vii, 69, ♀ ♂.
2207 ♀. Colorado. In good condition.

afflicta (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 217, ♀ ♂.
2337 ♀. Texas. In good condition.

agilis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 204, ♂
2315. Texas. In good condition.

agnatum (Anthidium), Trans. Am. Ent. Soc., vii, 117, ♂.
2413. Mexico. In good condition.

agnatus (Epeolus), Trans. Am. Ent. Soc., vii, 89, ♂.
2226. Dakota. In good condition.

albata (Anthophora), Proc. Davenp. Acad. Nat. Sci., i, 211, pl. 35, fig. 2.
2273 ♀. Denver, Colorado. In good condition.
albata (Melissodes), Trans. Am. Ent. Soc., iv, 281, ♀ ♂.
2352 ♀. Texas. In good condition.
albilabris (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 209, ♂.
2324. Mexico. In good condition.
albipennis (Perdita?), Trans. Am. Ent. Soc., i, 386, ♀.
2206. New Mexico. Both antennae off.
albitarsis (Megachile), Trans. Am. Ent. Soc., iv, 263, ♂.
2461. Texas. Left antenna off beyond joint three.
albitarsis (Panurgus), Trans. Am. Ent. Soc., iv, 260, ♀ ♂.
2203 ♀. Texas. In good condition.
albiventris (Osmia), Proc. Ent. Soc. Phil., iii, 31, ♀ ♂.
2539 ♀. New York. In good condition.
altilis (Coelioxys), Trans. Am. Ent. Soc., vii, 219.
See *brevis*|| Cress, *nec* Eversman.
americanus (Phileremus), Trans. Am. Ent. Soc., vii, 83, ♀ ♂.
2235 ♀. Colorado. In good condition.
amica (Megachile), Trans. Am. Ent. Soc., iv, 265, ♂.
2465. Texas. In good condition.
amoena (Nomada), Proc. Ent. Soc. Phil., ii, 300, ♀.
Rock Island, Illinois. (Coll. Benj. D. Walsh.) Probably destroyed in Chicago fire.
andrenoides (Panurgus), Trans. Am. Ent. Soc., vii, 62, ♂.
2165. Colorado. In good condition.
apacha (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 217, ♀.
2338. Texas. In good condition.
aperta (Coelioxys), Trans. Am. Ent. Soc., vii, 95, ♀.
2488. Colorado. In good condition.
apicale (Anthidium), Trans. Am. Ent. Soc., vii, 116, ♀ ♂.
2410 ♀. Mexico. In good condition.
apicalis (Lithurgus), Report Wheeler Expl., 1875, 724, ♀.
2419. Colorado. In good condition.
apicalis (Tetrapedia), Trans. Am. Ent. Soc., vii, 136, ♀.
2377. Mexico. In good condition.
apiculata (Tetralonia), Proc. Acad. Nat. Sci. Phil., 1878, 220, ♀.
2362. Costa Rica. In good condition.
appositus (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 183, ♀ ☿ ♂.
2639 ♀. Colorado. In good condition.
argentifrons (Monumetha), Proc. Ent. Soc. Phil., ii, 387, ♂.
2254. Pike's Peak, Colorado. Right antenna broken.
arizonensis (Xylocopa), Trans. Am. Ent. Soc., vii, 212, ♀ ♂.
2621 ♀. Arizona. In good condition.

armaticeps (Megachile), Trans. Am. Ent. Soc., ii, 296, ♀.
Cuba. In Gundlach Collection.
armaticeps (Osmia), Trans. Am. Ent. Soc., vii, 104, ♀.
2531. Colorado. In good condition.
armillatus (Centris), Trans. Am. Ent. Soc., ii, 298, ♂.
Cuba. In Gundlach Collection.
ashtoni (Apathus), Proc. Ent. Soc. Phil., iii, 42, ♀.
2684. New York. In good condition.
atrata (Anthophora), Proc. Ent. Soc. Phil., iv, 189, ♂.
2257. Cuba. In good condition.
atriceps (Calliopsis), Trans. Am. Ent. Soc., vii, 67, ♂.
2184. California. In good condition.
atriceps (Megachile), Proc. Ent. Soc. Phil., iv, 176, ♀.
2455. Cuba. In good condition.
atricornis (Calliopsis), Trans. Am. Ent. Soc., vii, 67, ♂.
2185. Colorado. In good condition.
atrifrons (Anthidium), Trans. Am. Ent. Soc., i, 387, ♀.
2726. New Mexico. In good condition.
atripes (Anthidium), Trans. Am. Ent. Soc., vii, 205, ♂.
2654. Nevada. Left antenna off. Described as a variety of *emarginatum* Say.
atripes (Melissodes), Trans. Am. Ent. Soc., iv, 275, ♀.
Texas. In Belfrage Collection, U. S. N. M. "Head gone."
atriventre (Anthidium), Trans. Am. Ent. Soc., vii, 111, ♀.
2392. California. In good condition.
atriventris (Osmia), Proc. Ent. Soc. Phil., iii, 29, ♀.
2516. Connecticut. Right antenna off.
aurigenia (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 212 ♀ ♂.
2332 ♀. Colorado. In good condition.
australis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 214, ♀ ♂.
2356 ♀. Colorado. In good condition.
australis (Stelis), Trans. Am. Ent. Soc., vii, 92, ♀.
2475. Georgia. In good condition.
avara (Megachile), Trans. Am. Ent. Soc., vii, 123, ♂.
2416. Georgia. In good condition.
azteca (Ceratina), Trans. Am. Ent. Soc., vii, 131, ♀ ♂.
2470 ♀. Mexico. In good condition.
azteca (Coelioxys), Trans. Am. Ent. Soc., vii, 100, ♀.
2508. Mexico. In good condition.
azteca (Megachile), Trans. Am. Ent. Soc., vii, 119, ♀ ♂.
2456 ♂. Mexico. In good condition.
azteca (Osmia), Trans. Am. Ent. Soc., vii, 105, ♀.
2542. Mexico. Extreme tip of right antenna off.
azteca (Xylocopa), Trans. Am. Ent. Soc., vii, 133, ♀.
2618. Mexico. In good condition.

aztecum (Anthidium), Trans. Am. Ent. Soc., vii, 109, ♀ ♂.
2383 ♀. Mexico. In good condition.

aztecus (Epeolus), Trans. Am. Ent. Soc., vii, 89, ♀.
2238. Mexico. In good condition.

bardus (Epeolus), Trans. Am. Ent. Soc., vii, 84, ♀.
2237. Texas. Tips of posterior tarsi off.

belfragei (Melissodes), Trans. Am. Ent. Soc., iv, 278, ♀.
Texas. In Belfrage Collection; type No. 1790, U. S. N. M.

belfragei (Nomada), Trans. Am. Ent. Soc., vii, 72, ♀.
2588. Texas. In good condition.

bella (Nomada), Proc. Ent. Soc. Phil., ii, 287, ♂.
2577. Massachusetts. In good condition.

bella (Osmia), Trans. Am. Ent. Soc., vii, 107, ♂.
2554. Colorado. In good condition.

bifarius (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 185, ♀ ☿.
2628 ♀. Colorado. In good condition.

bifasciatus (Epeolus), Proc. Ent. Soc. Phil., iii, 38, ♂.
2658. Illinois. In good condition.

bimaculatus (Bombus), Proc. Ent. Soc. Phil., ii, 92, ♂.
Connecticut. (Coll. Norton.) Type probably lost.

bituberculata (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 218, ♂.
2359. California. In good condition.

bivittatum (Anthidium), Trans. Am. Ent. Soc., vii, 116, ♂.
2411. Mexico. In good condition.

blanditum (Anthidium), Trans. Am. Ent. Soc., vii, 206, ♀.
2397. Nevada. In good condition.

bombiformis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 219, ♀ ♂.
2282 ♀. Kansas. In good condition.

borealis (Monumetha), Proc. Ent. Soc. Phil., ii, 388, ♀.
2253. Great Slave Lake, Hudson Bay Territory. In good condition.

brevicornis (Melissodes), Trans. Am. Ent. Soc., iv, 281, ♂.
2342. Texas. In good condition.

brevis (Coelioxys), Proc. Ent. Soc. Phil., ii, 402, ♀ ♂.
2490 ♀. Pennsylvania. In good condition. Name preoccupied; renamed *altilis* Cresson.

brevis (Osmia), Proc. Ent. Soc. Phil., iii, 36, ♀.
2528. Colorado. In good condition.

bucephala (Osmia), Proc. Ent. Soc. Phil., iii, 17, ♀.
2543. Great Slave Lake, Hudson Bay Territory. Most of right antenna off.

calcarata (Tetrapedia), Trans. Am. Ent. Soc., vii, 136, ♀ ♂.
2380 ♀. Mexico. In good condition.

californica (Anthophora), Trans. Am. Ent. Soc., ii, 290, ♂.
2264. California. Pubescence matted.

californica (Macrotera), Trans. Am. Ent. Soc., vii, 71, ♂.
2179. California. In good condition.
californica (Melecta), Trans. Am. Ent. Soc., vii, 91, ♀ ♂.
2292 ♂. California. In good condition.
californica (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 196, ♂.
2349. California. Right antenna off.
californica (Osmia), Proc. Ent. Soc. Phil., iii, 24, ♀.
2514. Fort Crook, California. In good condition.
californica (Xylocopa), Proc. Ent. Soc. Phil., iii, 40, ♀.
2619. Fort Crook, California. In good condition.
californicum (Anthidium), Trans. Am. Ent. Soc., vii, 206, ♂.
2390. California. In good condition.
californicum (Chelostoma), Trans. Am. Ent. Soc., vii, 108, ♂.
2248. California. In good condition.
californicus (Apathus?), Trans. Am. Ent. Soc., vii, 214, ♂.
2685. California. In good condition.
californicus (Calliopsis), Trans. Am. Ent. Soc., vii, 67, ♂.
2197. California. In good condition.
californicus (Epeolus), Trans. Am. Ent. Soc., vii, 86, ♀.
2219. California. Right antenna off.
caliginosa (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 192, ♀ ♂.
2364 ♀. Georgia. In good condition.
canadensis (Anthophora), Trans. Am. Ent. Soc., ii, 292, ♂.
2278. Ontario, Canada. In good condition.
canadensis (Osmia), Proc. Ent. Soc. Phil., iii, 33, ♂.
2556. Canada West. In good condition.
capistrata (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 187, ♂.
2259. Texas. In good condition.
carbonaria (Anthophora), Trans. Am. Ent. Soc., vii, 210, ♀.
2256. Nevada. In good condition.
carbonaria (Megachile), Trans. Am. Ent. Soc., vii, 208, ♀.
2420. Nevada. In good condition.
carinatum (Heriades), Proc. Ent. Soc. Phil., ii, 383, ♀ ♂.
2242 ♀. Pennsylvania. In good condition.
centralis (Bombus), Proc. Ent. Soc. Phil., iii, 41, ♀.
2629. Fort Crook, California. In good condition.
centriformis (Anthophora), Trans. Am. Ent. Soc., vii, 212, ♂.
2281. Nevada. In good condition.
cephalotes (Macrotera), Trans. Am. Ent. Soc., vii, 71, ♂.
2180. Nevada. Antennae off; wings in poor condition.
chalybaeus (Panurgus), Trans. Am. Ent. Soc., vii, 61, ♀ ♂.
2164 ♀. California. Right antenna off.
chichimeca (Coelioxys), Trans. Am. Ent. Soc., vii, 97, ♀.
2494. Mexico. In good condition.

chichimeca (Megachile), Trans. Am. Ent. Soc., vii, 130, ♀.
2434. Mexico. In good condition.
cinctus (Calliopsis), Trans. Am. Ent. Soc., vii, 201, ♀ ♂.
2189 ♀. Nevada. In good condition.
citrina (Nomada), Trans. Am. Ent. Soc., vii, 79, ♀.
2605. California. Right antenna off.
civilis (Nomada), Trans. Am. Ent. Soc., vii, 78, ♂.
2568. Colorado. In good condition.
clypeatus (Calliopsis), Trans. Am. Ent. Soc., vii, 67, ♂.
2198. Colorado. In good condition.
cobaltina (Ceratina), Trans. Am. Ent. Soc., vii, 132, ♂.
2473. Mexico. In good condition.
cobaltina (Osmia), Trans. Am. Ent. Soc., vii, 104, ♀.
2536. Nevada. In good condition.
coelioxoides (Megachile), Trans. Am. Ent. Soc., vii, 130, ♂.
2435. Mexico. In good condition.
cognata (Osmia), Proc. Ent. Soc. Phil., iii, 33, ♂.
2538. Illinois. Tip of left antenna off.
cognatum (Anthidium), Trans. Am. Ent. Soc., vii, 109, ♀ ♂.
2382 ♂. Georgia. In good condition.
coloradensis (Calliopsis), Trans. Am. Ent. Soc., vii, 63, ♀ ♂.
2187 ♀. Colorado. In good condition.
coloradensis (Coelioxys), Trans. Am. Ent. Soc., vii, 98, ♂.
2500. Colorado. In good condition.
coloradensis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 200, ♀ ♂.
2305 ♀. Colorado. In good condition.
coloradensis (Osmia), Trans. Am. Ent. Soc., vii, 105, ♀.
2513. Colorado. In good condition.
comanche (Melissodes), Trans. Am. Ent. Soc., iv, 276, ♀ ♂.
2306 ♀. Texas. In good condition.
comata (Megachile), Trans. Am. Ent. Soc., iv, 262, ♂.
Texas. In Belfrage Collection; type No. 1776, U. S. N. M. "Apices of antennae wanting, right has seven joints, left has eleven."
communis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 204, ♀ ♂.
2316 ♀. Georgia. In good condition.
compactus (Epeolus), Trans. Am. Ent. Soc., vii, 89, ♀ ♂.
2227 ♀. Texas. In good condition.
compta (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 199, ♀ ♂.
2302 ♀. Georgia. In good condition.
comstockii (Coelioxys), Trans. Am. Ent. Soc., vii, 96, ♀.
2497. New York. In good condition.
concavus (Epeolus), Trans. Am. Ent. Soc., vii, 85, ♀.
2241. California. In good condition.

concinnum (Anthidium), Trans. Am. Ent. Soc., iv, 270, ♀ ♂.
2402 ♂. Texas. In good condition.
condigna (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 207, ♀.
2318. Kansas. In good condition.
confusa (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 205, ♀ ♂.
2314 ♀. Colorado. In good condition.
conjuncta (Osmia), Proc. Ent. Soc. Phil., iii, 31, ♀.
2552. Connecticut. Both antennae broken.
consimilis (Bombus), Proc. Ent. Soc. Phil., iii, 41, ♀.
2636. New York. In good condition.
consonum (Anthidium), Trans. Am. Ent. Soc., vii, 207, ♀.
2398. Nevada. In good condition. Described as a variety of *illustre* Cresson.
conspicuum (Anthidium), Trans. Am. Ent. Soc., vii, 207, ♀.
2396. Nevada. Right antenna off.
contiguus (Apathus), Proc. Ent. Soc. Phil., ii, 112, ♂.
2686. Delaware. In good condition.
cornuta (Centris?), Proc. Ent. Soc. Phil., iv, 194, ♀.
Cuba. In Gundlach Collection.
costalis (Stelis), Trans. Am. Ent. Soc., iv, 274, ♀ ♂.
2476 ♀. Texas. In good condition.
couperi (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 185, ♀.
2169. Canada. In good condition.
crassipes (Anthidium), Trans. Am. Ent. Soc., vii, 112, ♀.
2656. Florida. In good condition.
crotchii (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 192, ♂.
2279. California. In good condition.
crotchii (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 184, ♀.
2168. California. In good condition.
crotchii (Nomada), Trans. Am. Ent. Soc., vii, 81, ♀.
2611. Fort Tejon, California. In good condition.
crudelis (Nomada), Trans. Am. Ent. Soc., vii, 82, ♀.
2612. Georgia. In good condition.
cubensis (Nomada), Proc. Ent. Soc. Phil., iv, 180, ♀ ♂.
2602 ♂. Cuba. In good condition. The ♀ in the Gundlach Collection.
cubiceps (Heriades?), Trans. Am. Ent. Soc., vii, 205, ♀.
2246. Nevada. Right posterior tarsus off.
curta (Megachile), Proc. Ent. Soc. Phil., iv, 178, ♂.
Cuba. In Gundlach Collection.
cyaniventris (Ceratina), Proc. Ent. Soc. Phil., iv, 179, ♀.
2474. Cuba. In good condition.
cylindricus (Andronicus), Proc. Ent. Soc. Phil., ii, 384, ♂.
2249. Connecticut. In good condition.
deflexa (Megachile), Trans. Am. Ent. Soc., vii, 125, ♂.
2441. Kansas. In good condition.

densa (Melissodes?), Trans. Am. Ent. Soc., iv, 282, ♂.
2354. Texas. In good condition.
densa (Osmia), Proc. Ent. Soc. Phil., iii, 25, ♀.
2527. Pike's Peak, Colorado. In good condition.
denticulatum (Heriades?), Trans. Am. Ent. Soc., vii, 108, ♂.
2244. Colorado. In good condition.
deplanata (Coelioxys), Trans. Am. Ent. Soc., vii, 96, ♀.
2487. Kansas. In good condition.
depressa (Nomada), Proc. Ent. Soc. Phil., ii, 302, ♀.
2560. Maine. In good condition.
dilecta (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 199, ♂.
2299. Colorado. In good condition.
dilucida (Nomada), Trans. Am. Ent. Soc., vii, 80, ♀.
2607. Colorado. Tip of left antenna off.
diminuta (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 215, ♂.
2357. Colorado. In good condition.
disparilis (Megachile), Trans. Am. Ent. Soc., iv, 264, ♂.
2717. Texas. In good condition.
distincta (Osmia), Proc. Ent. Soc. Phil., iii, 30, ♀.
2523. Connecticut. In good condition.
distinctus (Epeolus), Trans. Am. Ent. Soc., vii, 84, ♀ ♂.
2236 ♀. Georgia. In good condition.
donata (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 208, ♀.
2321. Mexico. In good condition.
dorsalis (Bombus), Trans. Am. Ent. Soc., vii, 230, ♀.
2651. Canada. In good condition.
dubia (Osmia), Proc. Ent. Soc. Phil., iii, 29, ♀.
2519. Pike's Peak, Colorado. Tip of both antennae off.
dubitata (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 194, ♀ ♂.
2296 ♀. Georgia. In good condition.
dubius (Bombus), Proc. Ent. Soc. Phil., ii, 97, ☿.
2647. Western Kansas. In good condition.
edita (Coelioxys), Trans. Am. Ent. Soc., iv, 272, ♂.
2502. Texas. In good condition.
edwardsii (Anthidium), Trans. Am. Ent. Soc., vii, 112, ♂.
2389. California. In good condition.
edwardsii (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 190, ♀ ♂.
2272 ♀. California. In good condition.
edwardsii (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 184, ♀ ☿ ♂.
2649 ☿. California. In good condition.
edwardsii (Calliopsis), Trans. Am. Ent. Soc., vii, 64, ♀ ♂.
2192 ♀. California. In good condition.
edwardsii (Melecta), Trans. Am. Ent. Soc., vii, 92, ♂.
2290. California. In good condition.

edwardsii (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 195, ♂.
2347. California. In good condition.
edwardsii (Nomada), Trans. Am. Ent. Soc., vii, 72, ♂.
2584. California. In good condition.
electa (Nomada), Proc. Ent. Soc. Phil., ii, 290, ♀ ♂.
2572 ♀. Illinois. In good condition.
elegans (Stelis), Proc. Ent. Soc. Phil., ii, 411, ♀.
2483. Pike's Peak, Colorado. In good condition.
enavata (Melissodes), Trans. Am. Ent. Soc., iv, 280, ♀.
2353. Texas. In good condition.
exigua (Anthophora), Trans. Am. Ent. Soc., vii, 211, ♀ ♂.
2276. ♀. Nevada. In good condition.
exiguua (Osmia), Trans. Am. Ent. Soc., vii, 107, ♂.
2555. California. In good condition.
exilis (Megachile), Trans. Am. Ent. Soc., iv, 265, ♂.
2439. Texas. In good condition.
exquisita (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 213, ♀.
2334. Mexico. In good condition.
faceta (Osmia), Trans. Am. Ent. Soc., vii, 103, ♀ ♂.
2515 ♀. New York. In good condition.
facunda (Megachile), Trans. Am. Ent. Soc., iv, 266, ♂.
2426. Texas. Left antenna broken.
festiva (Nomada), Proc. Ent. Soc. Phil., ii, 289, ♀.
2592. New Jersey. In good condition.
fidelis (Megachile), Trans. Am. Ent. Soc., vii, 120, ♀ ♂.
2460 ♂. Colorado. In good condition.
fimbriata (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 203, ♀ ♂.
2312 ♀. Texas. In good condition.
fimbriatus (Panurgus), Trans. Am. Ent. Soc., vii, 63, ♀.
2181. Colorado. In good condition.
flaviceps (Nomada), Proc. Ent. Soc. Phil., iv, 181, ♂.
Cuba. In Gundlach Collection.
flavifrons (Bombus), Proc. Ent. Soc. Phil., ii, 105, ♀ ☿ ♂.
2630 ♂. Fort Yukon, Alaska. Pubescence more or less matted.
flexipes (Anthophora), Trans. Am. Ent. Soc., vii, 211, ♀ ♂.
2275 ♀. Nevada. In good condition.
floridana (Coelioxys), Trans. Am. Ent. Soc., vii, 98, ♂.
2509. Florida. In good condition.
formosum (Anthidium), Trans. Am. Ent. Soc., vii, 112, ♂.
2395. Colorado. In good condition.
fortis (Megachile), Trans. Am. Ent. Soc., iv, 262, ♂.
2453. Texas. In good condition.
fragilis (Nomada), Trans. Am. Ent. Soc., vii, 79, ♂.
2604. Colorado. In good condition.

frater (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 197, ♂.
2345. Colorado. Tip of right antenna off.
fraterna (Tetrapedia), Trans. Am. Ent. Soc., vii, 136, ♂.
2379. Mexico. In good condition.
frugalis (Megachile), Trans. Am. Ent. Soc., iv, 266, ♂.
Texas. In Belfrage Collection; type No. 1780, U. S. N. M. "Condition good."
fulgida (Osmia), Proc. Ent. Soc. Phil., iii, 34, ♀.
2535. Colorado. In good condition.
fulvida (Melecta), Trans. Am. Ent. Soc., vii, 204, ♀.
2289. Nevada. In good condition. Described as a variety of *pacifica* Cresson.
fulvitarsis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 196, ♂.
2344. Colorado. In good condition.
fulviventris (Centris), Proc. Ent. Soc. Phil., iv, 193, ♀.
Cuba. In Gundlach Collection.
fulviventris (Phileremus), Trans. Am. Ent. Soc., vii, 83, ♂.
2232. California. Right antenna off.
fulvohirta (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 213, ♂.
2333. Georgia. In good condition.
gabbii (Anthidium), Trans. Am. Ent. Soc., vii, 115, ♂.
2409. Costa Rica. In good condition.
gabbii (Tetralonia), Proc. Acad. Nat. Sci. Phil., 1878, 220, ♀ ♂.
2361 ♀. Costa Rica. In good condition.
gelidus (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 184, ♀.
2638. Aleutian Islands, Alaska. In good condition.
gemula (Megachile), Trans. Am. Ent. Soc.. vii, 118, ♀ ♂.
2425 ♂. Georgia. Left antenna off.
generosa (Megachile), Trans. Am. Ent. Soc., vii, 125, ♀.
2443. Georgia. In good condition.
gentilis (Megachile), Trans. Am. Ent. Soc., iv, 267, ♂.
2720. Texas. In good condition.
georgica (Megachile), Trans. Am. Ent. Soc., vii, 123, ♀ ♂.
2415 ♀. Georgia. In good condition.
georgica (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 200, ♂.
2304. Georgia. In good condition.
georgica (Osmia), Trans. Am. Ent. Soc., vii, 105, ♀.
2537. Georgia. In good condition.
germana (Coelioxys), Trans. Am. Ent. Soc., vii, 102, ♀.
2492. Illinois. In good condition.
glabratus (Epeolus), Trans. Am. Ent. Soc., vii, 90. ♂.
2230. Georgia. Posterior legs more or less broken.
globosa (Osmia), Proc. Ent. Soc. Phil., iii, 36, ♀.
2520. Great Slave Lake, British America. Left antenna off.
gracilis (Nomada), Proc. Ent. Soc. Phil., ii, 295, ♂.
2578. Massachusetts. In good condition.

grandis (Megachile), Trans. Am. Ent. Soc., iv, 268, ♀.
2457. Texas. In good condition.
grandis (Nomada), Report Wheeler Expl., 1875, 725, ♀.
2582. Colorado. In good condition.
halictulus (Panurgus), Trans. Am. Ent. Soc., vii, 63, ♂.
2212. Colorado. In good condition.
heiligbrodtii (Nomada), Trans. Am. Ent. Soc., vii, 75, ♀ ♂.
2598 ♀. Texas. In good condition.
honesta (Melissodes), Trans. Am. Ent. Soc., iv, 279, ♂.
2346. Texas. In good condition.
howardii (Bombus), Proc. Ent. Soc. Phil., ii, 99, ♂.
2650. Pike's Peak, Colorado. In good condition.
hudsonica (Osmia), Proc. Ent. Soc. Phil., iii, 21, ♂.
2550. Hudson Bay Territory. Flagellum of left antenna off.
hudsonicus (Bombus), Proc. Ent. Soc. Phil., ii, 92 ♂.
Hudson Bay Territory. (Norton Collection.) Probably lost.
hyalina (Perdita), Trans. Am. Ent. Soc., vii, 68. ♂.
2213. Colorado. In good condition.
ignara (Ceratina), Trans. Am. Ent. Soc., vii, 132, ♀.
2471. Mexico. In good condition.
ignava (Anthophora), Trans. Am. Ent. Soc., vii, 210, ♀.
2271. Nevada. In good condition.
illinoiensis (Calliopsis), Trans. Am. Ent. Soc., vii, 66, ♂.
2196. Illinois. In good condition.
illustre (Anthidium), Trans. Am. Ent. Soc., vii, 206, ♀.
2399. Nevada. In good condition.
improbus (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 186, ♂.
2633. Colorado. In good condition.
incerta (Nomada), Proc. Ent. Soc. Phil., ii, 309, ♀.
2563. Illinois. Tip of left tarsus off.
infragilis (Megachile), Trans. Am. Ent. Soc., vii, 127, ♂.
2448. New York. In good condition.
ingenua (Megachile), Trans. Am. Ent. Soc., vii, 122, ♂.
2467. Georgia. Flagellum of right antenna off.
inimica (Megachile), Trans. Am. Ent. Soc., iv, 267, ♀.
2459. Texas. In good condition.
insita (Coelioxys), Trans. Am. Ent. Soc., iv, 273, ♀.
2499. Texas. In good condition.
integra (Megachile), Trans. Am. Ent. Soc., vii, 121, ♂.
2463. Texas. In good condition.
integra (Osmia), Trans. Am. Ent. Soc., vii, 106, ♂.
2547. Colorado. In good condition.
intermedia (Melissodes), Trans. Am. Ent. Soc., iv, 278, ♀.
Texas. Belfrage Collection. "Not found."

interrupta (Melecta), Trans. Am. Ent. Soc., iv, 275, ♀ ♂.
2291 ♀. Texas. In good condition.
interrupta (Perdita), Trans. Am. Ent. Soc., vii, 70, ♂.
2209. California. Right antenna off.
interrupta (Stelis), Trans. Am. Ent. Soc., vii, 205, ♀.
2482. Nevada. Flagellum of right antenna off.
intorta (Melissodes), Trans. Am. Ent. Soc., iv, 278, ♂.
2335. Texas. In good condition.
intrudens (Melissodes), Trans. Am. Ent. Soc., vii, 225, ♂.
See *nevadensis* || Cresson.
inurbana (Osmia), Trans. Am. Ent. Soc., vii, 107, ♂.
2553. Colorado. Apical half of left antenna off.
izucara (Megachile), Trans. Am. Ent. Soc., vii, 131, ♀ ♂.
2438 ♂. Mexico. In good condition.
jocosum (Anthidium), Trans. Am. Ent. Soc., vii, 111, ♂.
2388. Colorado. In good condition.
jocularis (Nomada), Trans. Am. Ent. Soc., vii, 202, ♀.
2586. Nevada. In good condition.
juxta (Osmia), Proc. Ent. Soc. Phil., iii, 19, ♀.
2533. Colorado. In good condition.
juxtus (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 187, ♀.
2641. Colorado. In good condition.
krugii (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 188, ♀ ♂.
2260 ♀. Porto Rico. In good condition.
krugii (Nomada), Trans. Am. Ent. Soc., vii, 75, ♀ ♂.
2566 ♀. Porto Rico. In good condition.
lacustris (Bombus), Proc. Ent. Soc. Phil., ii, 103, ♀ ☿ ♂.
2171 ♀. Lake Athabasca, Hudson Bay Territory. In poor condition, the pubescence matted and left wings off.
lanosa (Centris), Trans. Am. Ent. Soc., iv, 284, ♂.
2624. Texas. In good condition.
lata (Crocisa?), Trans. Am. Ent. Soc., vii, 91, ♂.
2486. Texas. In good condition. Type of *Ericrocis* Cresson.
lateralis (Calliopsis), Trans. Am. Ent. Soc., vii, 65, ♀.
2194. California. Left antenna off.
lateralis (Coelioxys), Proc. Ent. Soc. Phil., ii, 405, ♂.
2498. Pennsylvania. In good condition.
lateralis (Stelis), Proc. Ent. Soc. Phil., ii, 410, ♀.
2478. Pennsylvania. In good condition.
laticincta (Stelis), Trans. Am. Ent. Soc., vii, 92, ♀.
2477. California. In good condition.
latitarsis (Osmia), Proc. Ent. Soc. Phil., iii, 20, ♂.
2544. New York. Apical half of right antenna, and the left entirely, off.

lectus (Epeolus), Trans. Am. Ent. Soc., vii, 88, ♀.
2225. Kansas. In good condition.
legalis (Megachile), Trans. Am. Ent. Soc., vii, 209, ♂.
2464. Nevada. In good condition.
lepida (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 198, ♂.
2298. Texas. In good condition.
lepida (Nomada), Proc. Ent. Soc. Phil., ii, 288, ♂.
2579. Pike's Peak, Colorado. Flagellum of left antenna off.
lepidum (Anthidium), Trans. Am. Ent. Soc., vii, 115, ♂.
2408. Georgia. In good condition.
lepidus (Calliopsis), Trans. Am. Ent. Soc., vii, 68, ♀.
2199. Georgia. In good condition.
libata (Nomada), Trans. Am. Ent. Soc., vii, 80, ♀ ♂.
2608 ♀. Colorado. In good condition.
limata (Exomalopsis), Trans. Am. Ent. Soc., vii, 133, ♀.
2367. Mexico. In good condition.
limata (Nomada), Trans. Am. Ent. Soc., vii, 76, ♀.
2570. Mexico. In good condition.
longula (Osmia), Proc. Ent. Soc. Phil., iii, 19, ♀.
2549. Colorado. Pubescence of thorax matted.
lucrosa (Coelioxys), Trans. Am. Ent. Soc., vii, 97, ♀.
2496. New York. In good condition.
lucrosa (Megachile), Trans. Am. Ent. Soc., iv, 267, ♀.
Texas. In Belfrage Collection; type No. 1600, U. S. N. M. "Abdomen gone."
lugubris (Tetrapedia), Trans. Am. Ent. Soc., vii, 135, ♂.
2375. Mexico. In good condition.
lupina (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 210, ♂.
2329. California. In good condition.
maculata (Melecta), Trans. Am. Ent. Soc., vii, 204, ♀ ♂.
2293 ♀. Nevada. In good condition.
maculata (Nomada), Proc. Ent. Soc. Phil., ii, 303, ♀ ♂.
Connecticut. Not found.
maculifrons (Anthophora), Trans. Am. Ent. Soc., vii, 210, ♀ ♂.
2274 ♀. Nevada. In good condition.
maculosum (Anthidium), Trans. Am. Ent. Soc., vii, 110, ♀.
2384. Utah. In good condition.
mandibularis (Osmia), Trans. Am. Ent. Soc., vii, 102, ♀.
2512. Colorado. In good condition.
manifesta (Megachile), Trans. Am. Ent. Soc., vii, 122, ♂.
2466. Colorado. In good condition.
marginatus (Osiris), Trans. Am. Ent. Soc., vii, 83, ♀ ♂.
2616 ♀. Mexico. In good condition.
marginatus (Panurgus), Trans. Am. Ent. Soc., vii, 62, ♀.
2183. Kansas. In good condition.

marginella (Melissodes?), Trans. Am. Ent. Soc., iv, 282, ♀ ♂.
2659 ♀. Comal County, Texas. In good condition.
marginipennis (Osmia), Trans. Am. Ent. Soc., vii, 106, ♂.
2548. Colorado. In good condition.
maura (Megachile), Proc. Ent. Soc. Phil., iv, 179, ♀.
2421. Cuba. In good condition.
maura (Melissodes), Proc. Ent. Soc. Phil., iv, 188, ♀.
2295. Cuba. Left antenna off.
maura (Osmia), Trans. Am. Ent. Soc., vii, 104, ♀.
2534. Sierra Nevada, California. In good condition.
maura (Tetrapedia), Trans. Am. Ent. Soc., vii, 134, ♀ ♂.
2374 ♀. Mexico. In good condition.
maurus (Panurgus), Trans. Am. Ent. Soc., vii, 61, ♀.
2210. Colorado. In good condition.
medius (Bombus), Proc. Ent. Soc. Phil., ii, 97, ☿.
Utah (no doubt an error for Mexico). Coll. Smith. Inst. Not in Nat. Museum; probably lost.
megacephala (Macrotera), Trans. Am. Ent. Soc., vii, 71, ♂.
2178. Texas. In good condition.
megacephala (Osmia), Proc. Ent. Soc. Phil., iii, 18, ♀.
2545. Colorado. In good condition.
mellipes (Exomalopsis?), Trans. Am. Ent. Soc., vii, 134, ♀.
2372. Mexico. In good condition.
mellitarsis (Megachile), Trans. Am. Ent. Soc., vii, 121, ♂.
2462. Colorado. In good condition.
melliventris (Nomada), Trans. Am. Ent. Soc., vii, 82, ♂.
2564. California. In good condition.
mendica (Megachile), Trans. Am. Ent. Soc., vii, 126, ♀.
2446. Pennsylvania. In good condition.
menuachus (Melissodes), Trans. Am. Ent. Soc., i, 388, ♂.
2313. New Mexico. In good condition.
mexicana (Ceratina), Trans. Am. Ent. Soc., vii, 131, ♀ ♂.
2469 ♀. Mexico. In good condition.
mexicana (Coelioxys), Trans. Am. Ent. Soc., vii, 99, ♀ ♂.
2504 ♀. Mexico. Flagellum of right antenna off.
mexicana (Exomalopsis), Trans. Am. Ent. Soc., vii, 133, ♀.
2368. Mexico. In good condition.
mexicana (Megachile), Trans. Am. Ent. Soc., vii, 127, ♀ ♂.
2427 ♂. Mexico. In good condition.
mexicana (Nomada), Trans. Am. Ent. Soc., vii, 76, ♀.
2571. Mexico. In good condition.
mexicanum (Anthidium), Trans. Am. Ent. Soc., vii, 116, ♀ ♂.
2386 ♂. Mexico. In good condition.

mexicanus (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 187, ♀ ☿.
2646 ♀. Mexico. Tip of right posterior tarsus off.

mexicanus (Calliopsis), Trans. Am. Ent. Soc., vii, 65, ♀ ♂.
2195 ♂. Mexico. Upper left wing off.

mexicanus (Epeolus), Trans. Am. Ent. Soc., vii, 90, ♀ ♂.
2229 ♀. Mexico. In good condition.

mexicanus (Osiris), Trans. Am. Ent. Soc., vii, 82, ♀ ♂.
2615 ♀. Mexico. In good condition.

mimicus (Melissodes), Trans. Am. Ent. Soc., ii, 298, ♂.
2322. Cuba. Tips of posterior tarsi off.

miserabilis (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 191, ♂.
2285. California. In good condition.

mixtus (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 186, ♀ ☿.
2642 ♀. Colorado. In good condition.

modesta (Nomada), Proc. Ent. Soc. Phil., ii, 286, ♀ ♂.
2599 ♀. Illinois. In good condition.

moderatus (Bombus), Proc. Ent. Soc. Phil., ii, 109.
See *modestus* || Cresson, *nec* Smith.

modestus (Bombus), Proc. Ent. Soc. Phil., ii, 99, ♀.
2648 ♀. Yukon River, Alaska. Tips of antennae off. **Name preoccupied;** renamed *moderatus* Cresson.

moesta (Coelioxys), Proc. Ent. Soc. Phil., ii, 403, ♀.
2491. Connecticut. In good condition.

moesta (Tetrapedia), Trans. Am. Ent. Soc., vii, 135, ♀ ♂.
2376 ♀. Mexico. In good condition.

montana (Anthophora), Trans. Am. Ent. Soc., ii, 290, ♀.
2267. Colorado. In good condition.

montana (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 202, ♀ ♂.
2309 ♀. Colorado. In good condition.

montana (Osmia), Proc. Ent. Soc. Phil., iii, 24, ♂.
2529. Pike's Peak, Colorado. In good condition.

montana (Stelis), Proc. Ent. Soc. Phil., iii, 39, ♀.
2485. Colorado. In good condition.

montanus (Phileremus), Trans. Am. Ent. Soc., vii, 83, ♂.
2231. Nevada. In good condition.

montezuma (Centris), Trans. Am. Ent. Soc., vii, 213, ♀ ♂.
2625 ♂. Mexico. In good condition.

montezuma (Megachile), Trans. Am. Ent. Soc., vii, 129, ♀ ♂.
2431 ♂. Mexico. In good condition.

montezuma (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 194, ♀ ♂.
2366 ♀. Mexico. Antennae wanting.

monticola (Stelis?), Trans. Am. Ent. Soc., vii, 94, ♀.
2481. Colorado. In good condition.

montivaga (Megachile), Trans. Am. Ent. Soc., vii, 124, ♀ ♂.
2440 ♂. Colorado. In good condition.
montivagum (Anthidium), Trans. Am. Ent. Soc., vii, 110, ♀ ♂.
2391 ♂. Colorado. In good condition.
mormonum (Anthidium), Trans. Am. Ent. Soc., vii, 110, ♂.
2385. Utah. Flagellum of right antenna off.
morosa (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 193, ♀.
2365. Mexico. In good condition.
morrisoni (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 192, ♂.
2283. Colorado. In good condition.
morrisoni (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 183, ♀ ☿ ♂.
2632 ♀. Colorado. In good condition.
morrisoni (Nomada), Trans. Am. Ent. Soc., vii, 72, ♀.
2587. Colorado. In good condition.
mucida (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 191, ♀.
2284. Colorado. In good condition.
mucida (Megachile), Trans. Am. Ent. Soc., vii, 118, ♀ ♂.
2424 ♂. Georgia. In good condition.
mucida (Melecta?), Trans. Am. Ent. Soc., vii, 205, ♂.
2294. Nevada. Both antennae broken.
munda (Nomada), Trans. Am. Ent. Soc., vii, 80, ♀.
2606. Colorado. In good condition.
nevadensis (Bombus), Trans. Am. Ent. Soc., v, 102, ♀ ♂; Report Wheeler Expl., 1875, pl. 34, fig. 5, ♀.
2637 ♀. Nevada. Pubescence on thorax matted.
nevadensis (Epeolus), Trans. Am. Ent. Soc., vii, 86, ♀.
2220. Nevada. Tip of left antenna off.
nevadensis (Megachile), Trans. Am. Ent. Soc., vii, 209, ♀ ♂.
2468 ♂. Nevada. In good condition.
nevadensis (Melissodes), Trans. Am. Ent. Soc., v, 102; Report Wheeler Expl., 1875, pl. 34, fig. 6, ♂.
2301. Nevada. Pubescences on thorax matted.
nevadensis (Melissodes), Trans. Am. Ent. Soc., vii, 209, ♂.
2348. Nevada. In good condition. Name preoccupied; renamed *intrudens* Cresson.
nevadensis (Panurgus), Trans. Am. Ent. Soc., vii, 214, ♂.
2166. Nevada. In good condition.
nigerrima (Trigona), Proc. Acad. Nat. Sci. Phil., 1878, 181, ☿.
2173. Mexico. In good condition.
nigra (Trigona), Proc. Acad. Nat. Sci. Phil., 1878, 181, ☿.
2174. Mexico. In good condition.
nigrifrons (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 195, ♀.
2297. California. Right antenna off.

nigrifrons (Osmia), Trans. Am. Ent. Soc., vii, 103, ♀.
2526. Colorado. In good condition.
nigrifrons (Panurgus), Trans. Am. Ent. Soc., vii, 62, ♂.
2161. Texas. In good condition.
nitida (Stelis?), Trans. Am. Ent. Soc., vii, 92, ♀.
2479. New York. In good condition.
nupta (Megachile), Trans. Am. Ent. Soc., iv, 268, ♀.
2449. Texas. In good condition.
obliterata (Nomada), Proc. Ent. Soc. Phil., ii, 301, ♀.
2557. District of Columbia. Left antenna off beyond joint three.
obscurata (Perdita), Trans. Am. Ent. Soc., vii, 70, ♀ ♂.
2208 ♀. Georgia. In good condition.
obscurellus (Calliopsis), Trans. Am. Ent. Soc., vii, 201, ♀ ♂.
2201 ♀. California. In good condition.
obsoleta (Monumetha), Proc. Ent. Soc. Phil., ii, 388, ♂.
2255. Great Slave Lake, Hudson Bay Territory. In good condition.
occidentale (Anthidium), Trans. Am. Ent. Soc., i, 386, ♀ ♂.
2394 ♀. New Mexico. In good condition.
occidentalis (Anthophora), Trans. Am. Ent. Soc., ii, 292, ♀ ♂.
2277 ♀. Colorado. In good condition.
occidentalis (Epeolus), Trans. Am. Ent. Soc., vii, 87 , ♀ ♂.
2224 ♀. Colorado. Left antenna off beyond joint three.
olivacea (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 216, ♀ ♂.
2339 ♀. Mexico. In good condition.
opposita (Nomada), Trans. Am. Ent. Soc., vii, 73, ♀.
2590. California. Left antenna off.
optiva (Megachile), Trans. Am. Ent. Soc., iv, 268, ♀.
2445. Texas. Both antennae broken.
oregonensis (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 185, ♂.
2640. Oregon. Flagellum of left antenna off.
ornatipes (Panurgus), Trans. Am. Ent. Soc., iv, 260, ♂.
2205. Texas. In good condition.
osmoides (Megachile), Trans. Am. Ent. Soc., iv, 269, ♀ ♂.
2247 ♀. Texas. In good condition.
otomita (Centris), Trans. Am. Ent. Soc., vii, 214, ♂.
2627. Mexico. In good condition.
otomita (Coelioxys), Trans. Am. Ent. Soc., vii, 101, ♀.
2506. Mexico. In good condition.
otomita (Exomalopsis), Trans. Am. Ent. Soc., vii, 133, ♀.
2369. Mexico. In good condition.
otomita (Megachile), Trans. Am. Ent. Soc., vii, 123, ♂.
2417. Mexico. In good condition.
otomita (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 209, ♂.
2325. Mexico. Tip of right antenna off.

pacata (Nomada), Trans. Am. Ent. Soc., vii, 81, ♀.
2581. Colorado. In good condition.
pacifica (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 190, ♂.
2270. California. In good condition.
pacifica (Melecta), Trans. Am. Ent. Soc., vii, 91, ♂.
2288. California. In good condition.
pallidus (Bombus), Proc. Ent. Soc. Phil., ii, 92, ♀.
2652. Missouri. Right antenna off; pubescence slightly matted.
palliventre (Anthidium), Trans. Am. Ent. Soc., vii, 114, ♀.
2387. California. In good condition.
palmeri (Megachile), Trans. Am. Ent. Soc., vii, 119, ♀ ♂.
2454 ♂. Guadalupe Island, Lower California. In good condition.
parata (Nomada), Trans. Am. Ent. Soc., vii, 81, ♀.
2609. Colorado. Right antenna off.
parvum (Anthidium), Trans. Am. Ent. Soc., vii, 114, ♀ ♂.
2406 ♀. Colorado. In good condition.
parvus (Panurgus?), Proc. Ent. Soc. Phil., iv, 175, ♀ ♂.
2182 ♂. Cuba. In good condition. The ♀ in collection of Gundlach.
pauper (Calliopsis), Trans. Am. Ent. Soc., vii, 66, ♀ ♂.
2186 ♀. New York. In good condition.
perbrevis (Megachile), Trans. Am. Ent. Soc., vii, 127, ♂.
2450. Texas. In good condition.
perilampoides (Trigona), Proc. Acad. Nat. Sci. Phil., 1878, 181, ♀.
2175. Mexico. In good condition.
pernigra (Anthophora), Trans. Am. Ent. Soc., vii, 210, ♀.
2258. Nevada. In good condition.
perplexa (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 206, ♀ ♂.
2317 ♀. Georgia. In good condition.
perplexa (Nomada), Proc. Ent. Soc. Phil., ii, 306, ♀ ♂.
2559 ♀. Delaware. In good condition.
perplexus (Bombus), Proc. Ent. Soc. Phil., ii, 91, ♂.
Connecticut. (Coll. Norton.) Probably lost.
petulans (Megachile), Trans. Am. Ent. Soc., vii, 127, ♂.
2451. North Carolina. In good condition.
petulca (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 201, ♀.
2308. Georgia. In good condition.
picipes (Panurgus), Trans. Am. Ent. Soc., iv, 261, ♂.
2204. Texas. In good condition.
pictipes (Calliopsis), Trans. Am. Ent. Soc., vii, 65, ♂.
2193. Colorado. In good condition.
pilipes (Pasites), Proc. Ent. Soc. Phil., iv, 183, ♀ ♂.
2614 ♀. Cuba. In good condition.
pilosifrons (Alcidamea), Proc. Ent. Soc. Phil., ii, 386, ♂.
2251. Connecticut. In good condition.

pilosula (Nomada), Trans. Am. Ent. Soc., vii, 77, ♂.
2601. New York. In good condition.
pinguis (Megachile), Trans. Am. Ent. Soc., vii, 126, ♀.
2444. Georgia. In good condition.
pinguis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 216, ♀ ♂.
2343 ♀. Mexico. In good condition.
placida (Nomada), Proc. Ent. Soc. Phil., ii, 291, ♀ ♂.
2600 ♀. Pennsylvania. In good condition.
placitum (Anthidium), Trans. Am. Ent. Soc., vii, 206, ♀.
2393. Nevada. In good condition.
producta (Alcidamea), Proc. Ent. Soc. Phil., ii, 386, ♂.
2250. Virginia. Left antenna off.
producta (Coelioxys), Proc. Ent. Soc. Phil., iv, 187, ♀.
2510. Cuba. In good condition.
productus (Phileremus?), Trans. Am. Ent. Soc., vii, 203, ♀.
2234. Nevada. In good condition.
propinqua (Osmia), Proc. Ent. Soc. Phil., iii, 23, ♀.
2719. Fort Crook, California. Right wings off; pubescence more or less matted.
proxima (Nomada), Proc. Ent. Soc. Phil., ii, 294, ♂.
2576. Maine. Tips of both antennae off.
proxima (Osmia), Proc. Ent. Soc. Phil., iii, 32, ♂.
2517. Hudson Bay Territory. In good condition.
proximus (Bombus), Proc. Ent. Soc. Phil., ii, 98, ☿.
2167. Utah. Pubescence somewhat matted.
pubescens (Exomalopsis), Proc. Ent. Soc. Phil., iv, 192, ♂.
Cuba. In Gundlach Collection.
pudens (Anthidium), Trans. Am. Ent. Soc., vii, 208, ♀.
2405. Nevada. In good condition.
pudicum (Anthidium), Trans. Am. Ent. Soc., vii, 208, ♂.
2404. Nevada. In good condition.
pulchella (Exomalopsis), Proc. Ent. Soc. Phil., iv, 191, ♀ ♂.
2371 ♀. Cuba. In good condition.
pulchellus (Epeolus), Proc. Ent. Soc. Phil., iv, 185, ♂.
Cuba. In Gundlach Collection.
pulchellus (Phileremus?), Trans. Am. Ent. Soc., vii, 84, ♀ ♂.
2233 ♀. Colorado. In good condition.
pulcher (Bombus), Proc. Ent. Soc. Phil., ii, 108, ♀.
2645. Jalapa, Mexico. In good condition.
pullata (Melissodes), Proc. Ent. Soc. Phil., iv, 189, ♀ ♂.
2303 ♀. Cuba. In good condition. The ♂ in Gundlach Collection.
pumila (Osmia), Proc. Ent. Soc. Phil., iii, 35, ♀.
2540. Pennsylvania. Both antennae off.
punctipennis (Coelioxoides), Trans. Am. Ent. Soc., vii, 94, ♀.
2613. Mexico. Apical half of left antenna off.

purpurea (Osmia), Proc. Ent. Soc. Phil., iii, 27, ♀.
2522. Pennsylvania. In good condition.
purpurea (Xylocopa), Trans. Am. Ent. Soc., iv, 284, ♀.
2622. Texas. In good condition.
pusilla (Osmia), Proc. Ent. Soc. Phil., iii, 35, ♂.
2530. Pike's Peak, Colorado. In good condition.
pusillus (Epeolus), Proc. Ent. Soc. Phil., ii, 398, ♀.
2228. Massachusetts. Right antenna off beyond joint three.
putnami (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 185, ♀.
2170. Colorado. In good condition.
putnami (Nomada), Proc. Davenp. Acad. Nat. Sci., i, 210, pl. 35, fig. 1, ♀ ♂.
2594 ♀. Utah. In good condition.
pygmaea (Melissodes), Trans. Am. Ent. Soc., iv, 279, ♀.
2340. Texas. In good condition.
pygmaea (Nomada), Proc. Ent. Soc. Phil., ii, 299, ♂.
2561. Connecticut. Left flagellum off, also right wings.
quadriceps (Osmia), Trans. Am. Ent. Soc., vii, 104, ♀.
2532. California. In good condition.
4-dentata (Osmia), Trans. Am. Ent. Soc., vii, 107, ♂.
2551. New York. Right posterior legs, except coxa off.
regularis (Panurgus), Trans. Am. Ent. Soc., vii, 62, ♂.
2211. California. In good condition.
relativa (Megachile), Trans. Am. Ent. Soc., vii, 126, ♀.
2447. Colorado. In good condition.
ridingsii (Anthidium), Trans. Am. Ent. Soc., vii, 111, ♀.
2657. Georgia. In good condition.
ridingsii (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 182, ♀ ☿.
2635 ♀. West Virginia. In good condition.
ridingsii (Nomada), Trans. Am. Ent. Soc., vii, 74, ♀.
2595. Colorado. In good condition.
rivalis (Melissodes), Trans. Am. Ent. Soc., iv, 277, ♂.
2311. Texas. In good condition.
rivalis (Nomada), Trans. Am. Ent. Soc., vii, 79, ♂.
2603. California. In good condition.
robustus (Epeolus), Trans. Am. Ent. Soc., vii, 85, ♀.
2218. New Mexico. In good condition.
rotundiceps (Heriades?), Trans. Am. Ent. Soc., vii, 205, ♀.
2245. Nevada. In good condition.
rufocinctus (Bombus), Proc. Ent. Soc. Phil., ii, 106, ♂ ☿.
2643 ♂. Pike's Peak, Colorado. In good condition.
rustica (Osmia), Proc. Ent. Soc. Phil., iii, 37, ♂.
2524. Easton, Pennsylvania. In good condition.
sayi (Megachile), Trans. Am. Ent. Soc., vii, 119, ♂ ♀?
2458. Texas. Left antenna off beyond joint three.

scelestus (Epeolus), Trans. Am. Ent. Soc., vii, 86, ♀.
2221. Texas. In good condition.
scita (Nomada), Trans. Am. Ent. Soc., vii, 77, ♂.
2580. Colorado. In good condition.
scitula (Coelioxys), Trans. Am. Ent. Soc., iv, 273, ♀ ♂.
2503 ♂. Texas. In good condition.
scitulus (Calliopsis), Trans. Am. Ent. Soc., vii, 64, ♀.
2191. Colorado. In good condition.
scutellaris (Bombus), Proc. Ent. Soc. Phil., ii, 96, ♀ ♀.
2634 ♀. Texas. In good condition.
separata (Melecta), Trans. Am. Ent. Soc., vii, 204, ♀.
2287. Nevada. Tip of left antenna off.
separatus (Bombus), Proc. Ent. Soc. Phil., ii, 165, ♀ ♀ ♂.
2653 ♀. Pennsylvania. In good condition.
sericea (Osmia), Proc. Ent. Soc. Phil., iii, 27, ♂.
2518. Colorado. In good condition.
simile (Anthidium), Proc. Ent. Soc. Phil., ii, 378, ♀ ♂.
2414 ♂. Massachusetts. In good condition.
similis (Exomalopsis), Proc. Ent. Soc. Phil., iv, 191, ♀.
2373. Cuba. In good condition.
simillima (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 189, ♂.
2269. Colorado. In good condition.
simplex (Heriades), Proc. Ent. Soc. Phil., ii, 384, ♀.
2660. Connecticut. Condition poor; antennae broken.
singulare (Anthidium), Trans. Am. Ent. Soc., vii, 207, ♀.
2400. Nevada. In good condition.
singularis (Megachile), Proc. Ent. Soc. Phil., iv, 177, ♂.
Cuba. In Gundlach Collection.
smithii (Anthophora), Trans. Am. Ent. Soc., ii. 289, ♀ ♂.
2261 ♂. Colorado. In good condition.
snowii (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 211, ♂.
2330. Colorado. In good condition.
snowii (Nomada), Trans. Am. Ent. Soc., vii, 75, ♀ ♂.
2597 ♀. Colorado. In good condition.
sodalis (Anthophora), Trans. Am. Ent. Soc., vii, 212, ♂.
2280. Nevada. In good condition.
sodalis (Coelioxys), Trans. Am. Ent. Soc., vii, 99, ♂.
2501. Colorado. In good condition.
speciosa (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 198, ♀.
2350. Colorado. In good condition.
spissa (Melissodes), Trans. Am. Ent. Soc., iv, 280, ♀.
2331. Texas. In good condition.
stretchii (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 207, ♀.
2319. California. Left antenna off, also tips of posterior tarsi.

strenua (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 213, ♀ ♂.
2341 ♂. Texas. In good condition.
strenuus (Bombus), Proc. Ent. Soc. Phil., ii, 102, ♀ ♂.
2172 ♀. Hudson Bay Territory. Pubescence matted from insertion in alcohol.
studiosa (Megachile), Trans. Am. Ent. Soc., iv, 269, ♀.
2729. Texas. In good condition.
suavis (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 210, ♀.
2328. Colorado. In good condition.
suavis (Nomada), Trans. Am. Ent. Soc., vii, 74, ♀ ♂.
2596 ♀. Oregon. In good condition.
subcaerulea (Stelis?), Trans. Am. Ent. Soc., vii, 93, ♂.
2484. California. All the tarsi more or less broken.
subemarginata (Stelis?), Trans. Am. Ent. Soc., vii, 93, ♀.
2480. Colorado. In good condition.
subfasciata (Osmia), Trans. Am. Ent. Soc., iv, 261, ♀ ♂.
2541 ♀. Texas. In good condition.
subnigra (Megachile), Trans. Am. Ent. Soc., vii, 208, ♀ ♂.
2423 ♀. Nevada. In good condition.
subvirescens (Xylocopa), Trans. Am. Ent. Soc., vii, 213, ♀ ♂.
2617 ♀. Mexico. In good condition.
suda (Nomada), Trans. Am. Ent. Soc., vii, 203, ♀.
2573. Nevada. In good condition.
suffusa (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 203, ♀ ♂.
2310 ♀. Texas. In good condition.
sumichrasti (Megachile), Trans. Am. Ent. Soc., vii, 129, ♂.
2433. Mexico. In good condition.
sumichrasti (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 218, ♀ ♂.
2358 ♀. Mexico. In good condition.
superba (Nomada), Proc. Ent. Soc. Phil., ii, 281, ♂.
2583. Pike's Peak, Colorado. In good condition.
tegularis (Coelioxys), Trans. Am. Ent. Soc., ii, 297, ♀.
Cuba. In Gundlach Collection.
tejonensis (Ceratina), Proc. Ent. Soc. Phil., ii. 390, ♂.
2472. Fort Tejon, California. Flagellum of right antenna off.
tepaneca (Coelioxys), Trans. Am. Ent. Soc., vii, 100, ♀.
2507. Mexico. In good condition.
tepaneca (Exomalopsis), Trans. Am. Ent. Soc., vii, 134, ♀.
2370. Mexico. In good condition.
tepaneca (Megachile), Trans. Am. Ent. Soc., vii, 128, ♀.
2430. Mexico. In good condition.
tepaneca (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 211, ♀ ♂.
2326 ♀. Mexico. In good condition.
tepanecus (Epeolus), Trans. Am. Ent. Soc., vii, 88, ♂.
2239. Mexico. In good condition.

tepida (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 210, ♀.
2327. Nevada. In good condition.
terminalis (Anthophora), Trans. Am. Ent. Soc., ii, 292, ♀ ♂.
2360 ♀. Colorado. In good condition.
terminalis (Tetrapedia), Trans. Am. Ent. Soc., vii, 136, ♀.
2378. Mexico. In good condition.
texana (Anthophora), Trans. Am. Ent. Soc., iv, 282, ♀.
Texas. Belfrage Collection. "Not found."
texana (Coelioxys), Trans. Am. Ent. Soc., iv, 272, ♀ ♂.
2495 ♀. Dallas, Texas. In good condition.
texana (Macrotera), Trans. Am. Ent. Soc., vii, 70, ♀.
2177. Texas. In good condition.
texana (Megachile), Trans. Am. Ent. Soc., vii, 125, ♀ ♂.
2442 ♂. Texas. In good condition.
texana (Melissodes), Trans. Am. Ent. Soc., iv, 276, ♀ ♂.
2307 ♀. Texas. In good condition.
texana (Nomada), Trans. Am. Ent. Soc., iv, 271, ♀ ♂.
2567 ♀. Texas. In good condition.
texana (Osmia), Trans. Am. Ent. Soc., iv, 261, ♂.
Texas. Not found. A specimen in Belfrage Collection marked "Type No. 1751," U. S. N. M.
texana (Xylocopa), Trans. Am. Ent. Soc., iv, 283, ♀ ♂.
2620 ♀. Texas. In good condition.
texanum (Anthidium), Trans. Am. Ent. Soc., vii, 113, ♂.
2655. Texas. In good condition.
texanus (Epeolus), Trans. Am. Ent. Soc., vii, 87, ♂.
2223. Texas. In good condition.
thoracica (Melecta), Report Wheeler Expl., 1875, 726, pl. 33, fig. 5, ♀.
2286. Colorado. In good condition.
thoracica (Trigona), Proc. Acad. Nat. Sci. Phil., 1878, 181, ♀.
2176. Mexico. In good condition.
tibialis (Megachile), Trans. Am. Ent. Soc. ii, 296, ♀.
Cuba. In Gundlach Collection. Described as a variety of *curta* Cresson.
tibialis (Nomada), Proc. Ent. Soc. Phil., iv, 182, ♀.
2569. Cuba. Flagellum of right antenna off.
tolteca (Coelioxys), Trans. Am. Ent. Soc., vii, 95, ♀.
2505. Mexico. In good condition.
toltecum (Anthidium), Trans. Am. Ent. Soc., vii, 117, ♂.
2412. Mexico. In good condition.
toluca (Megachile), Trans. Am. Ent. Soc., vii, 129, ♂.
2432. Mexico. In good condition.
toluca (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 219, ♀ ♂.
2336 ♀. Mexico. In good condition.

totonaca (Centris), Trans. Am. Ent. Soc., vii, 213, ♀.
2626. Mexico. In good condition.
totonaca (Coelioxys), Trans. Am. Ent. Soc., vii, 102, ♀ ♂.
2511 ♀. Mexico. In good condition.
totonaca (Megachile), Trans. Am. Ent. Soc., vii, 117, ♀.
2422. Mexico. In good condition.
totonacus (Epeolus), Trans. Am. Ent. Soc , vii, 87, ♀.
2222. Mexico. In good condition.
trifasciata (Melissodes), Proc. Acad. Nat. Sci. Phil., 1878, 208, ♀.
2323. Porto Rico. In good condition.
truncata (Alcidamea), Trans. Am. Ent. Soc., vii, 108, ♂.
2252. Georgia. In good condition.
tuxtla (Megachile), Trans. Am. Ent. Soc., vii, 128, ♂.
2429. Mexico. In good condition.
uhlerii (Coelioxys), Proc. Ent. Soc. Phil., iv, 186, ♀.
2489. Cuba. Tip of right antenna off.
ulkei (Anthidium), Trans. Am. Ent. Soc., vii, 115, ♀.
2407. Utah. In good condition.
urbana (Anthophora), Proc. Acad. Nat. Sci. Phil., 1878, 188, ♀ ♂.
2265 ♀. Utah. In good condition.
ursina (Anthophora), Trans. Am. Ent. Soc., ii, 291, ♂.
2268. West Virginia. In good condition.
ursina (Melissodes?), Trans. Am. Ent. Soc., iv, 281, ♂.
2355. Texas. In good condition.
vancouverensis (Bombus), Proc. Acad. Nat. Sci. Phil., 1878, 187, ♂.
2644. Vancouver Island, British Columbia. In good condition.
variabilis (Apathus), Trans. Am. Ent. Soc., iv, 284, ♀ ♂.
2687 ♀. Texas. In good condition.
variolosa (Megachile), Trans. Am. Ent. Soc., iv, 270, ♀.
2243. Texas. In good condition.
venustum (Anthidium), Trans. Am. Ent. Soc., vii, 113, ♀.
2401. Colorado. In good condition.
verecunda (Nomada), Trans. Am. Ent. Soc., vii, 203, ♀ ♂.
2565 ♂. Nevada. In good condition.
vicina (Nomada), Proc. Ent. Soc. Phil., ii, 292, ♀ ♂.
2575 ♀. New York. Right antenna off.
vicina (Osmia), Proc. Ent. Soc. Phil., iii, 38, ♂.
2525. Virginia. Left antenna and tip of right, off; pubescence somewhat matted.
vicinalis (Nomada), Trans. Am. Ent. Soc., vii, 78, ♂.
2574. Colorado. In good condition.
vicinus (Epeolus), Proc. Ent. Soc. Phil., iv, 185, ♀ ♂.
2217 ♂. Cuba. In good condition.
vinnula (Nomada), Trans. Am. Ent. Soc., vii, 202, ♀ ♂.
2585 ♀. Nevada. In good condition.

viridis (Osmia), Proc. Ent. Soc. Phil., iii, 34, ♀.
2718. Colorado. Flagellum of both antennae broken.
vitticollis (Nomada), Trans. Am. Ent. Soc., vii, 78, ♀.
2562. Mexico. In good condition.
walshii (Anthophora), Trans. Am. Ent. Soc., ii, 290, ♀ ♂.
2262 ♂. Illinois. In good condition.
wilsoni (Epeolus), Proc. Ent. Soc. Phil., iv, 183, ♂.
2216. Cuba. In good condition.
zacatecus (Epeolus), Trans. Am. Ent. Soc., vii, 85, ♀.
2240. Mexico. In good condition.
zapoteca (Coelioxys), Trans. Am. Ent. Soc., vii, 99, ♀.
2493. Mexico. Extreme tips of antennae off.
zapoteca (Megachile), Trans. Am. Ent. Soc., vii, 128, ♀.
2428. Mexico. In good condition.
zaptlana (Megachile), Trans. Am. Ent. Soc., vii, 130, ♀.
2436. Mexico. In good condition.
zebrata (Nomada), Trans. Am. Ent. Soc., vii, 73, ♀ ♂.
2589 ♂. Colorado. In good condition.
zebrata (Perdita), Trans. Am. Ent. Soc., vii, 69, ♀.
2214. Colorado. Left antenna off.
zebratum (Anthidium), Trans. Am. Ent. Soc., iv, 270, ♂.
2403. Texas. In good condition.
zebratus (Calliopsis), Trans. Am. Ent. Soc., vii, 64, ♀.
2188. Colorado. In good condition.
zonalis (Calliopsis), Trans. Am. Ent. Soc., vii, 201, ♂.
2190. California. In good condition.
zonalis (Perdita), Trans. Am. Ent. Soc., vii, 202, ♀.
2215. Nevada. In good condition.

THE ENTOMOLOGICAL WRITINGS OF EZRA TOWNSEND CRESSON (1861—1911)

1861. Catalogue of the CICINDELIDAE of North America. Proc. Ent. Soc. Phil., I, 7–20.

(1) Catalogue of the described species of TENTHREDINIDAE and UROCERIDAE, inhabiting North America. Proc. Ent. Soc. Phil., I, 33–39.

(2) A Catalogue of the described species of several families of HYMENOPTERA inhabiting North America. Proc. Ent. Soc. Phil., I, 202–211, 227–238, 316–344.

1863. (3) Description of a new species of MASARIS from the Rocky Mountains. Proc. Ent. Soc. Phil., II, 69–74, pl. iv.

(4) List of the North American species of BOMBUS and APATHUS. Proc. Ent. Soc. Phil., II, 83–116.

(5) [A communication on some BOMBUS with description of a new species.] Proc. Ent. Soc. Phil., II, 164–166.

(6) On the North American species of the genus NOMADA. Proc. Ent. Soc. Phil., II, 280–312.

1864. (7) On the North American species of several genera of APIDAE. Proc. Ent. Soc. Phil., II, 373–411.

(8) On the North American species of the genus OSMIA. Proc. Ent. Soc. Phil., III, 17–38.

(9) Descriptions of several new species of North American APIDAE. Proc. Ent. Soc. Phil., III, 38–43.

(10) Descriptions of North American HYMENOPTERA in the collection of the Entomological Society of Philadelphia. Proc. Ent. Soc. Phil., III, 131–196, 257–321.

(11) Descriptions of two new genera of North American ICHNEUMONIDAE. Proc. Ent. Soc. Phil., III, 397–402.

(12) Descriptions of two new species of MASARIS. Proc. Ent. Soc. Phil., III, 672–678.

1865. (13) On the HYMENOPTERA of Cuba. Proc. Ent. Soc. Phil., IV, 1–200.

(14) Catalogue of HYMENOPTERA in the collection of the Entomological Society of Philadelphia from Colorado Territory. Proc. Ent. Soc. Phil., IV, 242–313, 426–488.

(15) Descriptions of some new species of MUTILLA from California. Proc. Ent. Soc. Phil., IV, 385–390.

(16) Monograph of the PHILANTHIDAE of North America. Proc. Ent. Soc. Phil., V, 85–132.

1867. (17) Descriptions of two new species of TRIGONALYS. Proc. Ent. Soc. Phil., VI, 351–352.

(18) Notes on the POMPILIDAE of North America, with descriptions of new species. Trans. Am. Ent. Soc., I, 85–150.

(19) A list of the ICHNEUMONIDAE of North America, with descriptions of new species Parts I–II. Trans. Am. Ent. Soc., I, 289–312; II, 89–114.

1868. (20) Catalogue of a small collection of HYMENOPTERA made in New Mexico during the summer of 1867. Trans. Am. Ent. Soc., I, 375–388.

(21) Descriptions of new Canadian ICHNEUMONIDAE. Can. Ent., I, 33–38.

(22) Catalogue of a collection of HYMENOPTERA made by Prof. F. Sumichrast near Cordova, Mexico. Trans. Am. Soc. Ent. II, 1–38.

(23) Descriptions of North American Bees. Nos. 1–2. Proc. Boston. Soc. Nat. Hist., XII, 165–171, 269–273.

1869. (24) Descriptions of four new species of Canadian HYMENOPTERA. Can. Ent., I, 103–105.

(25) Descriptions of two new species of AROTES. Trans. Am. Ent. Soc., II, 260.

(26) A list of the North American species of the genus ANTHOPHORA, with descriptions of new species. Trans. Am. Ent. Soc., II, 289–293.

(27) Notes on Cuban HYMENOPTERA, with descriptions of new species. Trans. Am. Ent. Soc., II, 293–298.

1869. (28) List of the North American species of the genus ALEIODES, Wesmael. Trans. Am. Ent. Soc., II, 377–382.

(29) Notes on Mexican POMPILIDAE, with descriptions of new species. Proc. Boston Soc. Nat. Hist., XII, 366–380.

1870. (30) Descriptions of new species belonging to the subfamily PIMPLARIAE found in America north of Mexico. Trans. Am. Ent. Soc., III, 143–172.

1871. (31) Descriptions of two new species of MASARIS. Trans. Am. Ent. Soc., III, 348.

1872. (32) Synopsis of the North American species belonging to the Genera LEUCOSPIS, SMICRA and CHALCIS. Trans. Am. Ent. Soc., IV, 29–60.

(33) Description of a new species of MASARIS from California. Trans. Am. Ent. Soc., IV, 87–88.

(34) Hymenoptera Texana. Trans. Am. Ent. Soc., IV, 153–292.

(35) Descriptions of North American HYMENOPTERA. Nos. 1–7. Can. Ent., IV, 21–24, 61–64, 81–84, 226–231; V, 51–54, 66–69, 82–85.

1873. (36) [Notes on "Descriptions of North American Hymenoptera by Benj. D. Walsh."] Trans. St. Louis Acad. Sci., III, 65–166.

(37) Descriptions of Mexican ICHNEUMONIDAE. Proc. Acad. Nat. Sci. Phil., XXV, 104–176, 374–413.

1874. (38) Descriptions of New HYMENOPTERA. Trans. Am. Ent. Soc., V, 99–102.

1875. (39) Descriptions of New Species of MUTILLA. Trans. Am. Ent. Soc., V, 119–120.

(40) Report upon the collections of HYMENOPTERA made in portions of Nevada, Utah, Colorado, New Mexico and Arizona during the years 1872, 1873 and 1874. Rept. Wheeler Expl. (Eng. Dept. U. S. Army), Zool., V, Chap. vii, 707–728, pls. 33–34.

1876. (41) List of HYMENOPTERA collected by J. Duncan Putnam, of Davenport, Iowa, with descriptions of two new Species. Proc. Davenp. Acad. Sci., I, 206–211, pl. XXXV.

1877. (42) Notes on the species belonging to the subfamily ICHNEUMONIDAE found in America north of Mexico. Trans. Am. Ent. Soc., VI, 129–212.

1878. (43) Descriptions of new ICHNEUMONIDAE. Can. Ent., X, 205–210.

(44) Descriptions of new species of North American Bees. Proc. Acad. Nat. Sci. Phil., 1878, 181–221.

(45) Descriptions of ICHNEUMONIDAE chiefly from the Pacific slope of the United States and British North America. Proc. Acad. Nat. Sci. Phil., 1878, 348–381.

(46) Parasite on Magdalis (*Calyptus magdalis* Cresson). Psyche, II, 189.

(47) Hymenopterous Insect from Stems of the Black Raspberry (*Dimorus zabriskii* Cresson). Psyche, II, 189.

(48) Descriptions of new North American HYMENOPTERA in the collection of the American Entomological Society. (Family APIDAE.) Trans. Am. Ent. Soc., VII, 61–136, 201–214.

1879. (49) Catalogue of North American APIDAE. Trans. Am. Ent. Soc., VII, 215–232.

(50) [Description of a new species, *Euchroeus Edwardsii.*] Proc. Ent. Sec. A. N. S. P., 1879, p. iv. (Trans. VII.)

(51) [Descriptions of new species of *Eupargia* and *Trigonalis.*] Proc. Ent. Sec. A. N. S. P., 1879, p. vi–vii. (Trans., VII.)

(52) [Descriptions of new species of *Oryssus* and *Cleptes.*] Proc. Ent. Sec. A. N. S. P., 1879, p. ix–x. (Trans., VII.)

(53) Descriptions of new North American HYMENOPTERA in the collection of the American Entomological Society. (EVANIIDAE.) Trans. Am. Ent. Soc., VII, 255–256.

1879. (54) [Descriptions of new species of *Ibalia*, *Aulacus* and *Pterochilus*.] Proc. Ent. Sec., A. N. S. P., 1879, p. xvii–xix. (Trans., VII.)

(55) [Descriptions of five new species of *Eucerceris*.] Proc. Ent. Sec. A. N. S. P., 1879, p. xxiii–xxiv. (Trans., VII.)

(56) [Descriptions of ten new species of *Metopius*.] Proc. Ent. Sec. A. N. S. P., 1879, p. xxvii-xxix. (Trans., VII.)

(57) [Descriptions of seven new species of *Philanthus*.] Proc. Ent. Sec. A. N. S. P., 1879, p. xxxii.–xxxiv. (Trans., VII.)

1880. (58) Descriptions of new North American HYMENOPTERA in the collection of the American Entomological Society. Families TENTHREDINIDAE and UROCERIDAE. Trans. Am. Ent. Soc., VIII, 1–52.

(59) Catalogue of the TENTHREDINIDAE and UROCERIDAE of North America. Trans. Am. Ent. Soc., VIII, 53–68.

(60) [Descriptions of three new species of *Aulacus*.] Proc. Ent. Sec. A. N. S. P., 1880, p. v–vi. (Trans., VIII.)

(61) [Descriptions of new species of *Rhitigaster*, *Stephanus* and *Gorytes*.] Proc. Ent. Sec. A. N. S. P., 1880, p. xvii–xviii. (Trans., VIII.)

(62) [Synoptic tables of the species of *Sapyga*, including new species.] Proc. Ent. Sec. A. N. S. P., 1880, p. xx–xxi, (Trans., VIII.)

1881. (63) [Descriptions of new species of *Liris* and *Astata*.] Proc. Ent. Sec. A. N. S. P., 1881, p. iii–vi. (Trans., IX.)

(64) [Descriptions of two new species of *Eucerceris* and *Mellinus*.] Proc. Ent. Sec. A. N. S. P., 1881, p. xxxviii–xxxix. (Trans., IX.)

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THE BLATTIDAE OF NORTH AMERICA

NORTH OF THE MEXICAN BOUNDARY

BY
MORGAN HEBARD

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THE BLATTIDAE OF NORTH AMERICA, NORTH OF THE MEXICAN BOUNDARY[1]

BY MORGAN HEBARD

It has been evident for some time that a number of the names used for the Blattidae of North America have been employed with considerable uncertainty. Many species have been studied from but few specimens, and hardly any comparative work has been done in associating the forms with exotic species of nearest affinity. The much larger series now available has led the author to undertake a general study of the North American forms.

Exceptionally large collections of Blattidae, from the other portions of the New World, have assisted greatly in the formation of conclusions as to the relationships and the relative values of many characters of the forms here considered.[2] Reference to

[1] As the title indicates, the present study treats only those forms found north of the Mexican boundary, and North America in this restricted sense is understood throughout this paper, unless further qualified.

[2] We have published, during the preparation of the present study, the following papers, all having some bearing on the species here treated.

"A New Species of the Genus Neoblattella from Costa Rica." Ent. News, xxvii, pp. 159 to 161, (March 31, 1916).

"The Genus Ceratinoptera." Trans. Am. Ent. Soc., xlii, pp. 125 to 134, (April 8, 1916).

"A New Genus, Cariblatta, of the Group Blattellites." Trans. Am. Ent. Soc. xlii, pp. 147 to 186, (April 26, 1916).

"Certain Features found in the Genus Panchlora, with other Observations and the Description of one New Species." Ent. News, xxvii, pp. 217 to 222, (May 2, 1916).

"Critical Notes on Certain Species of the Genus Blaberus." Ent. News, xxvii, pp. 289 to 296, (June 30, 1916).

"Studies in the Group Ischnopterites." Trans. Am. Ent. Soc., xlii, pp. 337 to 383, (Nov. 15, 1916).

other considerable collections of Blattidae, particularly those from Africa, has aided, but mainly in affording negative evidence of close affinity, the species examined representing, in the great majority of cases, groups and genera having but little bearing on those at present under consideration.[3]

Generic association of the species was at once found to be a serious problem, the difficulties in the present work being particularly complex in the Pseudomopinae, where two genera, *Blattella* and *Ischnoptera*, were found to include each a large number of valid generic units, while *Kakerlac*, *Ceratinoptera* and *Temnopteryx* have been used as a veritable dumping ground for a varied assortment of perplexing forms, many agreeing only to some extent in the degree of reduction of the tegmina and wings.

Treatment

Detailed descriptions of each genus and species in the present paper were deemed inadvisable, but careful analyses of the features of real differential value are given as well as full descriptions of coloration. Particular attention is also given to the range of variation in each species, as confusion in subsequent work is much the more likely to occur upon encountering features representing mere individual, though striking, variations.

The treatment of certain groups is more detailed than that of the majority. Thus, the very large series of the genus *Parcoblatta* has led us to discuss in detail the species of the group Ischnopterites included in the present study. The confusion which has existed in the group Blattellites has also necessitated a more elaborate study of the genera and the species there considered. In the Polyphaginae, series of intimate significance, from both the southwestern United States and Mexico, have led us to include all our North American material in the present treatment, not confining the study, as almost universally elsewhere, to material from north of the Mexican boundary.

[3] As an example; the African species, which have been described as *Ischnoptera*, now before us, are indeed members of the Group Ischnopterites, but in no case are they referable to *Ischnoptera* s. s., or to any other of the New World related genera.

Method

The armament of the ventro-cephalic margins of the cephalic femora has been classed as type 1 or A, showing a gradual reduction in size and length of spines distad, and type 2 or B, showing spines which change abruptly from elongate and heavy proximad, to very much shorter and more delicate distad. This distinction is found to be too general, and is only mentioned here when roughly indicating the general character of the armament of these margins as found in certain genera. Generic and even specific differences of degree are found, which can not be characterized properly without detailed description. It would be convenient if, in describing different genera, such terms as "strongly type A" or "type B approaching type A" could be used, but it is clear that for each author, such comparative words would be apt to have a somewhat different significance.

The male sex in many species has been found to have very important diagnostic features in the chitinous processes concealed between the supra-anal and subgenital plates. As these parts have never been used to any extent in systematic studies, we have been obliged to supply the following terms. The orifice in which these processes are found is termed the "anal chamber." The processes themselves are termed the "concealed genitalia," of which the longest and most highly specialized is termed the "genital hook." The function of the various processes as yet remains undetermined.

The exposed portions of the supra-anal and subgenital plates are alone considered in the descriptions of these structures. In the majority of species, the male anal chamber extends to the base of the second ventral (penultimate) abdominal segment preceding the subgenital plate. The subgenital plate is found to extend to this point, though subchitinous in structure in the concealed portion.

Measurements. The body length is found useful, but it must be understood that it would vary in the same specimen in life, due to the contraction or extension of the abdomen; in consequence, when abdominal distortion is evident, the normal length is estimated. The body length is considered as the distance from the

vertex to the apex of the subgenital plate. The tegminal length, unless otherwise stated, is taken from its base, a brief distance beneath the pronotum, to its apex.

The color terms used are taken from Ridgway's "Color Standards and Nomenclature."

We have not been able to obtain sufficient females bearing oothecae, to determine the real significance of the position in which these egg sacks are carried. Shelford has indicated that, whether the ootheca is carried with suture dorsad or laterad might afford a character in determining the relationship of many forms.[4] We are extremely sceptical on this point, as females before us of *Parcoblatta pensylvanica* have the ootheca with suture both dorsad and laterad, while an example of *Cariblatta punctulata* has the ootheca with suture dorsad and one of the closely related *Cariblatta lutea minima* has the suture laterad. It is possible that, in at least some forms, the ootheca first appears with suture dorsad and is gradually turned until, when fully extruded, it is carried with suture laterad. Studies of living material will be necessary to solve this problem.

Future Field Work Required

The forms upon which future field work should throw additional light, are:

Ischnoptera rufa occidentalis. To determine whether this insect is an established adventive on the Gulf Coast from New Orleans to the Mexican boundary, and to ascertain more about its distribution in Mexico.

Pycnoscelus surinamensis. To find if this insect is parthenogenetic in America; nearly four hundred females have been recorded from this continent, but no males.

Compsodes schwarzi. The female sex is unknown.

In the Mexican species of the Polyphagites, material to prove the synonymy under *Homoeogamia mexicana*, into which will probably fall *guttipennis*, *aequalis* and *azteca;* additional material from different portions of the range of *Arenivaga rehni*, to determine the significance of the tremendous variation found in that

[4] Trans. Ent. Soc. London, 1906, p. 235, (1906).

species, and additional males of *Eremoblatta hirsuta*, the unique specimen of that sex having suffered from immersion in alcohol.

Diagnostic Values

In considering the various diagnostic features, the most important discovery has been that of the superlative value in many genera of the Pseudomopinae of the form and specialization of the median and dorsal abdominal segments in the male sex. In a number of the species of the genus *Parcoblatta* the specialization there found proves, by far, the most valuable character for separating males.

The characters generally considered in the present paper and their general values are as follows:

Size individually often variable; showing occasionally some slight geographic significance.

Form moderately constant; in many species very different in the two sexes.

Head with shape often of some generic importance, usually difficult to describe. Slight differences are usual between the sexes; very decided differences are found when, in the same species, the males have the tegmina and wings fully developed and the females have these organs decidedly reduced or entirely absent. In such cases the females have the head much simpler than the males.

Interocular space occasionally decidedly variable, but sometimes of diagnostic value; width best compared with width between antennal sockets, or with that between ocelli, when these are present.

Ocelli showing few specific diagnostic features, but differing decidedly in many genera and groups. Usually fully developed in individuals having fully developed tegmina and wings; when reduction in the organs of flight occurs, the ocelli are found to exhibit a similar degree of reduction, and in species or sex showing decidedly reduced or atrophied tegmina and wings, they are usually represented by mere pale spots. When the organs of flight are absent, either in both sexes or only the females of a species, the ocelli are absent in the majority of forms, present, though greatly reduced, in few.

Maxillary palpi, though differing decidedly in different genera, of little specific diagnostic value. Individual slight variations are found in the length of the three distal joints.

Pronotum in size, form and contour showing frequent generic, occasional specific, diagnostic features. Some variation, however, in such useful features as point of greatest width and depth of discal sulci, when present, almost always occurs. The form varies with reduction in the organs of flight, this most noticeable in a greater truncation of the caudal margins, which makes the latero-caudal angles much more acute, moves the point of greatest width caudad, and develops a more even general convexity of the pronotal surface. Where great differences occur in the organs of flight of the sexes of the same species, the differences in the pronotum are likewise decided.

The tegmina and wings offer features of decided generic importance. These must always be considered with allowances for the forms in which reduction occurs in one or both of the sexes.[5] The general plan of the veins, particularly the direction of the tegminal discoidal sectors, is the most valuable and least variable generic feature, but in some groups the division of certain veins is of decided generic diagnostic value.[6] Differences in the number of rami of certain veins are, in all the forms we have considered, attributable to mere individual variation. In some groups the folding of the wing, intercalated triangle or appendicular field, is of importance, both generic and specific, the lesser differences, of specific value, being subject to slight variations. When reduction in length occurs, particularly when this has reached a decided degree, the general character of such is often of decided specific value in one or both sexes, though occasionally in many species some variation is encountered. The costal veins of the wings sometimes show important features, as do the rami of the discoidal vein.

[5] Much of the worst confusion in the past, both generic and specific, has been due to failure to recognize this factor. Minor differences in venation have also, at times, been incorrectly supposed to warrant specific separation. On the other hand, ignorance of the specific rather than generic value of tegminal and wing reduction, in one or both sexes, led to error in generic designation.

[6] Thus the discoidal vein of the tegmina and wings forks in *Symploce* and *Xestoblatta* alone of the known American genera of the Group Ischnopterites.

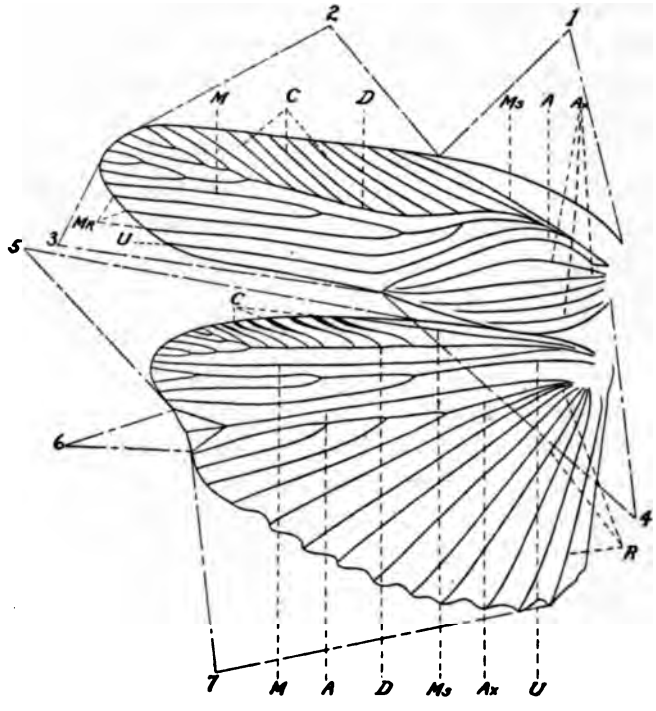


Diagram of the fully developed tegmen and wing of a Blattid.

1. Marginal Field.
2. Scapular Field.
3. Discoidal Field.
4. Anal Field.
5. Anterior Field.
6. Intercalated Triangle.
7. Posterior Field.

Ms. Mediastine Vein.
D. Discoidal Vein.
C. Costal Veins.
M. Median Vein.
Mr. Branches of Median Vein.
U. Ulnar Vein.
A. Anal Sulcus.
Ax. Axillary Vein.
R. Radiate Veins.

This figure is given, with the names used by previous authors for the various fields and veins, by Hebard, Trans. Am. Ent. Soc., xlii, pp. 185 and 186, pl. xiii, (1916).

In species where the area here represented by the Intercalated Triangle, is more extensive and reflexed, it is termed the Appendicular Field.

The dorsal surface of the abdomen, including the median segment, is greatly specialized in males of many species, and offers fixed characters of the greatest diagnostic importance. This is not true of females, though in some species some differences, usually only of degree, occur.

The supra-anal plate in males of certain species is important in form and structure. The form of this plate has also been considered diagnostic for certain subfamilies, but we have been unable to determine the value of such features. This plate is much more simple in females and often shows variability in contour in many species; in this sex it is rarely of diagnostic importance.

The cerci are of different types in many groups and genera. When specialization occurs, it is normally more decided in the male sex. In some groups specific diagnostic features are found in the male cerci,[7] such is very rare in others.[8]

The genitalia concealed between the male supra-anal and subgenital plates are very often of decided specific diagnostic value. Unfortunately these are difficult to study in dried material.[9] Little of diagnostic value is to be found in the anal chamber of females.

The subgenital plate in males of some species is important in form, its appendages frequently showing other characters of highly diagnostic importance. This plate is represented by a number of distinct types in females,[10] but rarely shows features of specific diagnostic value.

[7] In the genus *Panchlora* the male cercal characters are of great importance in many species. See Hebard, Ent. News, xxvii, p. 218, (1916).

[8] See under *Parcoblatta uhleriana* (Saussure), showing diagnostic specific male cercal characters, alone of the species of Group Ischnopterites here considered. Somewhat similar specialization, but of no diagnostic value, due to its variability, is sometimes found in both sexes of *Parcoblatta pensylvanica* (De Geer).

[9] In the Polyphaginae these features are found to be of the highest importance, but removal of the subgenital plate, before study of dried material, is almost always necessary.

[10] It is particularly interesting to note that a valvular type of the female subgenital plate, which has long been considered an important characteristic of the Blattinae, is also found in the Corydiids, *Holocompsa nitidula* and *Compsodes delicatulus* and in the Polyphagid, *Homoeogamia mexicana*, but of a different general type in these species.

The styles, present only on the male subgenital plate, have often generic or even higher significance in their general character, though in some genera very distinctive types are found, which are clearly of specific diagnostic value alone.[11] In many species slight but constant differences in the styles are found. It appears that often when the male concealed genitalia are highly specialized, the styles remain simple in structure; while when the male concealed genitalia are more simple, the styles often become highly specialized. The high specialization in these two sets of organs apparently shows in different forms, at least in part, an analogous function. In other groups both concealed genitalia and styles are more simple in structure. In some species no styles are found on the male subgenital plate.

The limbs themselves show few readily describable diagnostic features, but their general character of armament is apparently of the highest value in the arrangement of the groups and also in separating many genera. Slight differences are, with few exceptions, worthless for specific separation. The limbs often differ greatly in the sexes of species where general dissimilarity between males and females occurs, this even extending to the limb armament in certain species. The presence or absence of pulvilli and arolia are of value in associating the groups; rarely these organs show, in their structure, features of specific diagnostic value.

It must be remembered that, until the Blattidae of the world are monographed, the relative values of all the diagnostic features can not be fully determined. The above statements, however, apply fully to the forms here treated and to the exotic material examined.

It is evident that, until such monographic work is accomplished, the validity and proper position of some of the subfamilies will remain in doubt. Thus we can not say whether the Ectobiinae can be separated from the Pseudomopinae by sufficient characters, or whether all of the genera there included are properly located. In fact, exceptions, in different degree, to the majority of the subfamily characters given by Shelford occur. That author had

[11] Note the great diversity of these appendages in the genus *Cariblatta*. See Hebard, Trans. Am. Ent. Soc., xlii, p. 153, (1916).

indeed made a valiant beginning in the general study of the Blattidae, but it is evident that time and material were lacking for definite conclusions in much of the work accomplished, while his untimely end left many of the vital problems untouched.

Conclusions

In considering these facts, it is at once evident that the males of the Blattidae show a much more intricate development than the females, affording many striking features, which are not only of specific, but also of generic diagnostic value. Indeed, it is clear that, in many cases, the great majority of diagnostic features, of specific or even higher importance, are not to be found in the simplified female structure.

The primary male sexual characters are, in great measure, only of the highest specific importance; but in the general type of the concealed genitalia and of the styles, a certain amount of generic or higher significance is often found.

The secondary male sexual features which frequently have full generic values are: head development, pronotal specialization, character of tegmina and wings and arrangement of certain veins, specialization of median and dorsal abdominal segments and (when much more rarely decided sexual difference occurs) type of limb armament.

The reduced, atrophied or absent tegmina and wings of the females of many species apparently show a wider differentiation from the primitive than do the generally more intricately developed structures of the males. Study of the fossil Blattidae shows few examples among the known forms in which decided reduction, accompanied by truncation, of the tegmina occurred in the female. The males of those species, however, were generally of as intricate structure as those of the present day.

Distribution and Number

The Blattidae are found in North America but little north of the Canadian boundary. In the United States the native species are in most portions few in number, and no forms of this category are known from north of the southern portions of the great central

western area, including the higher portions of the Great Plains, the Rocky Mountain system and the Great Basin. Only in the very limited tropical areas along the southern border of the United States, extreme southern Florida and the Florida Keys, the Brownsville region of Texas and several even smaller areas along the Mexican line in New Mexico and Arizona, are the species numerous and present in large numbers.

The Pseudomopinae are represented by twenty-four species, all of the other subfamilies by a total of nineteen; totaling forty-three established species and one geographic race, of which ten species are probably established adventives. Of the total, fourteen are found only in the tropical portions of the United States, six of these being established adventive species.

Key to the Males of the Blattidae found in North America, north of of Mexico[12]

A. Ventral margin of femora supplied with numerous spines. (Median and caudal femora with a disto-dorsal genicular spine. Tegmina present. Tarsal claws simple.)

B. Ventro-cephalic margin of cephalic femora armed with a row of heavy proximal spines, succeeded by a row of more slender, shorter, distal spines (type B). (Arolia present.)

C. Fourth tarsal joint alone bearing a pulvillus. Tegmina with oblique discoidal sectors, where these are not obliterated by tegminal reduction.

D. Dorsal surface of abdomen not specialized. Pronotum distinctively and strikingly marked. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. (Size small.)

E. Tegmina fully developed, extending beyond apex of abdomen. Concealed genitalia unusually highly specialized. Subgenital plate with two very small, rounded styles, slightly longer than wide. Pronotum shining blackish brown, margined laterad and cephalad with buffy, which band, at the latero-caudal angles, crosses the pronotum before the caudal margin, in this transverse portion being broader than elsewhere.

Euthlastoblatta abortiva (Caudell)

EE. Tegmina considerably reduced, truncate, leaving distal portion of abdomen exposed. Concealed genitalia not highly specialized. Subgenital plate with very broad, short styles, in large part fused with the distal margin. General coloration buffy, beautifully marbled and marked

[12] The species of the genera *Parcoblatta* and *Arenivaga* are not included in the present key. Keys to distinguish the males of these species are given under their respective generic discussions.

with blackish brown. Pronotum buffy, disk bordered rather narrowly with blackish brown and with an anchor-shaped marking of this color, the arms of which are cephalad.....**Aglaopteryx gemma** new species

DD. Dorsal surface of abdomen with sixth segment specialized and succeeding segments transversely constricted. Pronotum not distinctively and strikingly marked. .Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. (Size medium small. Tegmina fully developed, extending beyond apex of abdomen. Styles elongate, heavy, inset, produced and adjacent mesad. General coloration warm buff.)

E. Head warm buff, with inter-ocular-ocellar area prout's brown, broken mesad by twin spots of warm buff. Interocular space half that between antennal sockets. Concealed process between styles with distal portion slightly broadening and faintly roughened.

Latiblattella rehni new species

EE. Head warm buff, vertex strikingly pale buff, face maculate with prout's brown. Interocular space three-quarters that between antennal sockets. Concealed process between styles with distal portion enlarged, flattening out caudad with margin rounded.

Latiblattella lucifrons new species

CC. Four proximal tarsal joints each bearing a pulvillus. Tegmina with discoidal sectors weakly radiating.

D. Sixth dorsal abdominal segment bearing mesad, at specialization of sixth and seventh segments, two minute, chitinous projections, armed dorso-distad with elongate, delicate teeth. Styles not deflexed, of very unequal bulk. (Subgenital plate strongly asymmetrical. Dextral style heavy, cylindrical, curving weakly sinistrad; sinistral style slender, tapering, straight, not half as long as dextral style. General coloration shining blackish brown. Limbs and spines ochraceous orange.)

Ischnoptera deropeltiformis (Brunner)

DD. Dorsal surface of abdomen either specialized or unspecialized, but never showing armed projections or character of specialization found in *Ischnoptera*. Styles slender, deflexed, cylindrical processes, with rounded apices, the dextral slightly the longer.....**Parcoblatta**[13]

BB. Ventro-cephalic margin of cephalic femora armed with a row of spines which decrease gradually in size and length distad (type A). Four proximal tarsal joints each bearing a pulvillus.

C. Supra-anal plate not bilobate. Form not depressed.

D. Structure moderately delicate. Styles variously specialized; not slender, elongate, straight, symmetrical processes of equal length, situated in sockets on margin of subgenital plate.

[13] A key to the males of the twelve species of this genus is given on page 174.

E. Ulnar vein of wings without proximal incomplete rami.

F. Tegmina with strongly oblique discoidal sectors. (Size medium small. Tegmina fully developed, extending beyond apex of abdomen. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. Abdomen with sixth dorsal segment specialized and succeeding segments transversely constricted. Subgenital plate triangularly produced, with large, elongate styles directed along the margin of the plate toward its apex. General coloration ochraceous-buff. Pronotum with latero-caudal blotches of deep chestnut brown and with disk ochraceous tawny. Tegmina transparent buckthorn brown, paler distad, with a broad, transverse, paler band at apex of anal field.).....**Supella supellectilium** (Serville)

FF. Tegmina with longitudinal discoidal sectors.

G. Tegmina with discoidal sectors not angulate at apex of anal field. Antennae not hirsute in basal half. Pronotum not angulato-produced caudad.

H. Pronotum not distinctively marked. Size small to very small. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. Dorsal surface of abdomen unspecialized. Subgenital plate symmetrical. Styles similar, minute, rounded, with dorsal surface armed, situated in brief marginal concavities.

I. Tegmina less reduced, not quite reaching apex of abdomen, 5.2 to 6.6 mm. Produced portion of subgenital plate between styles transverse rectangulate, nearly three times as broad as long.....**Cariblatta lutea lutea** (Saussure and Zehntner)

II. Tegmina more reduced, leaving distal portion of abdomen exposed, 3.6 to 5 mm. Produced portion of subgenital plate between styles subquadrate, very slightly longer than wide.

Cariblatta lutea minima Hebard

HH. Pronotum distinctively marked with paired, moderately heavy, longitudinal lines of deep mars brown. Size medium small. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Abdomen with sixth dorsal segment to and including the supra-anal plate, distinctively specialized. Subgenital plate strongly asymmetrical. Sinistral style very small, rounded; dextral style very minute, not half as large. (Tegmina fully developed, extending beyond apex of abdomen.).....**Blattella germanica** (Linnaeus)

GG. Tegmina with discoidal sectors angulate at apex of anal field. Antennae hirsute in basal half. Pronotum considerably angulato-produced caudad, with apex rounded. (Size medium small. Dorsal surface of abdomen with second, third, sixth and seventh segments specialized. Styles very dissimilar, the dextral showing the greater specialization. Tegmina fully developed, extending beyond apex

of abdomen. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. General coloration russet to brownish black; pronotum cinnamon rufous, broadly margined with cream color.) . . . . . **Pseudomops septentrionalis** new species

EE. Ulnar vein of wings with proximal incomplete rami. (Size medium small. General coloration ochraceous tawny. Tegmina fully developed, extending beyond apex of abdomen; discoidal sectors longitudinal. Discoidal vein of tegmina and wings forked. Pronotum with caudal margin weakly obtuse-angulate produced, with apex broadly rounded. Sixth dorsal abdominal segment specialized. Dextral style small, heavy, cylindrical, with apex flattened and margin produced sinistrad; sinistral style more slender, curved, over twice as long as dextral.) . . **Symploce lita** Hebard

DD. Structure heavily chitinous. Femoral spines very heavy. Styles slender, elongate, straight, symmetrical processes of equal length, set in sockets on margin of subgenital plate. (Concealed genitalia complex.)

E. Arolia present. Size large.

F. Tegmina much reduced.

G. Tegmina represented by subquadrate pads, with sutural margins weakly overlapping. General coloration immaculate dark claret brown. Pronotum rarely showing traces of lateral yellow bands. **Eurycotis floridana** (Walker)

GG. Tegmina represented by small, rounded trigonal, lateral pads. General coloration blackish brown, involutely pictured with buffy. **Neostylopyga rhombifolia** (Stoll)

FF. Tegmina and wings fully developed, extending beyond apex of abdomen.

G. Dorsal surface of abdomen unspecialized. Supra-anal plate subchitinous, extending as a hyaline mantle for half its length beyond subgenital plate, the distal portion divided. Cerci very elongate and slender distad. (General coloration reddish brown. Pronotum antimony yellow, with two very large, suffused blotches of chestnut. Tegmina unicolorous.) . . . . . **Periplaneta americana** (Linnaeus)

GG. Dorsal surface of abdomen with median segment specialized mesad. Supra-anal plate entirely chitinous, roughly trapezoidal in form. Cerci not as elongate, not as slender distad.

H. Ventral surface of subgenital plate unspecialized. Coloration not solid. General coloration reddish brown.

I. Tegmina unicolorous. Pronotum antimony yellow, with two very large, suffused blotches of chestnut. **Periplaneta brunnea** Burmeister

II. Tegmina deep bay, with marginal field strikingly ochraceous-buff. Pronotum ochraceous-buff with an orange tinge, with two large, sharply defined blotches of black. **Periplaneta australasiae** (Fabricius)

HH. Ventral surface of subgenital plate specialized. Coloration solid, shining blackish brown.

Periplaneta fuliginosa (Serville)

EE. Arolia absent. Size medium. (Tegmina and wings covering about two-thirds of abdomen, truncate distad. General coloration shining blackish chestnut brown. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, subrectangulate.)

Blatta orientalis Linnaeus

CC. Supra-anal plate weakly bilobate. Form depressed. (Size medium small. Tegmina and wings fully developed, (normally) slightly exceeding apex of abdomen. Ulnar vein of wings with proximal incomplete rami. Pronotum maroon, bordered laterad and cephalad with warm buff, two rotundato-angulate invasions of this color into the disk on each side and one mesocephalad. Concealed genitalia showing a mesal mantle. Subgenital plate asymmetrical, convex. Styles minute, elongate and slender, dextral the longer, situated in a broad, rather deeply concave emargination.[14])

Leurolestes pallidus (Brunner)

AA. Ventral margins of femora unarmed, or supplied with few distal spines.[15]

B. Tegmina present.

C. Tegmina and wings fully developed, extending beyond apex of abdomen.

D. Anal field of wings folding fan-wise. Surface of insect smooth.

E. Wings without an appendicular field. Dorsal surface of abdomen unspecialized. Supra-anal plate weakly bilobate. Four proximal tarsal joints each bearing a pulvillus. Ocellar spots present.

F. Size medium small. Pronotum strongly obtuse-angulate produced caudad, with apex rounded. Arolia present. (General coloration light paris green. Ventral margins of femora frequently with a single, reduced, distal spine on all, or some, of these margins, or unarmed.)

Panchlora cubensis Saussure

FF. Size extremely large. Pronotum subelliptical. Arolia absent. (Coloration blackish brown and buffy. Pronotum buffy, with a large, shield-shaped, shining blackish brown area, in which are striking pale markings. Tegmina, part blackish brown, part buffy. Ventro-cephalic margin of cephalic femora with few stout, proximal spines, succeeded by a closely set row of stout hairs. All ventral femoral margins with single stout, distal spines. Concealed genitalia showing a mesal mantle. Subgenital plate asymmetrical, convex. Styles minute, elongate and slender, dextral the longer, situated in a broad, rather deeply concave emargination.) **Blaberus craniifer** Burmeister

[14] The general character of the male subgenital plate and concealed genitalia shows close agreement with the genus *Blaberus*.

[15] In *Attaphila fungicola*, the ventro-cephalic margin of the caudal femora alone is supplied with several stout spines.

EE. Wings with an appendicular field. Dorsal surface of abdomen with sixth segment specialized mesad. Supra-anal plate not bilobate. Fourth tarsal joint alone supplied with a pulvillus. Ocellar spots absent. General coloration ochraceous-buff with a tawny tinge. (Ventral margins of femora, excepting caudal margin of cephalic femora, each supplied with a single, elongate, distal spine. Large arolia present.)

F. Tarsal claws simple. Pronotum nearly deplanate. Subgenital plate with styles inset mesad and produced in elongate and attingent scutes. Appendicular field large, slightly wider than long. Size small.

Chorisoneura texensis Saussure and Zehntner

FF. Tarsal claws specialized, showing on each internal margin two microscopic teeth. Dorsal surface convex, suggesting certain forms of Coleoptera. Subgenital plate with slender, cylindrical styles inset along lateral borders of a subquadrate mesal emargination, the base of which is triangularly produced. Appendicular field very large, much longer than wide. Size very small.

Plectoptera floridana new species

DD. Anal field of wings not folding. Surface of insect hairy.

E. Ocelli present (with surfaces convex). Subgenital plate somewhat asymmetrical.

F. Ocelli minute. Ocellar areas not defined. Tegmina opaque, hairy, with veins very weakly defined proximad; membranous, clear transparent distad. Ventro-cephalic margin of cephalic femora supplied with a row of minute, chaetiform spines, terminated by two heavy, elongate, distal spines; other ventral femoral margins unarmed. Four proximal tarsal joints each bearing a pulvillus. Moderately well developed arolia present. Size very small. Styles minute, elongate, the sinistral the longer. (Head, underparts and limbs blackish. Antennae each with a pale distal annulus. Pronotum and proximal portion of tegmina black, with a weak, metallic, green-blue sheen.)

Holocompsa nitidula (Fabricius)

FF. Ocelli large. Ocellar areas strikingly defined. Tegmina delicate in structure with veins distinct. Ventral femoral margins unarmed. Pulvilli absent. Arolia absent. Size large to medium small. Styles absent. (Concealed genitalia complex.)

G. Median and caudal femora with a disto-dorsal genicular spine. Ventral margins of femora supplied with numerous stiff hairs. Supra-anal plate produced, delicate in structure, weakly bilobate. Genital hook curved inward. Subgenital plate with surface unspecialized.

Arenivaga[16]

[16] A key to the males of the North American species of the Polyphaginae is given on page 217. The four species of *Arenivaga*, found north of the Mexican boundary, are there tabulated.

GG. Median and caudal femora lacking a disto-dorsal genicular spine. Ventral margins of femora supplied with very numerous, elongate, silky hairs. Supra-anal plate not produced. Genital hook curved outward. Subgenital plate with surface specialized proximo-sinistrad.....**Eremoblatta subdiaphana** (Scudder)

EE. Ocelli absent. Subgenital plate symmetrical. (Tegmina with veins distinct, discoidal sectors oblique. Ventral margins of femora unarmed. Pulvilli absent. Arolia vestigial. Size very small. Styles small, slender, rather elongate, placed laterad on distal margin. General coloration buffy, diaphanous.).....**Compsodes schwarzi** (Caudell)

CC. Tegmina much reduced. Wings vestigial. (Tegmina rhomboidal, sutural margins overlapping, distal margins truncate. Ventro-cephalic margin of cephalic femora armed with a single, delicate, distal spine; other ventral femoral margins unarmed, except cephalic margin of caudal femora, which is supplied with several stout spines. Pulvilli absent. Large arolia present. Size minute. Subgenital plate asymmetrical, without styles. General coloration amber yellow.).....**Attaphila fungicola** Wheeler

BB. Tegmina absent. (Distal portion of abdomen covered by the produced sixth dorsal and ventral abdominal segments. Subgenital plate concealed, symmetrical, produced. Styles similar, elongate, cylindrical, springing from sharp, brief, latero-distal emarginations of the distal margin of the plate. Size medium, form elongate. Coloration shining blackish brown. Ocelli absent. Pronotum thickened and somewhat hooded cephalad. Cephalic femora with ventro-cephalic margin armed distad with two or three stout spines, ventro-caudal margins of all femora (normally) armed with two similar distal spines, other ventral femoral margins unarmed. Four proximal tarsal joints heavy, each bearing a pulvillus; tarsal claws heavy. Arolia absent.)

Cryptocercus punctulatus Scudder

Key to the Females of the Blattidae found in North America, north of Mexico[17]

A. Ventral margins of femora supplied with numerous spines. (Median and caudal femora with a disto-dorsal genicular spine. Tegmina present. Tarsal claws simple.)

B. Subgenital plate simple. (Arolia present.)

C. Ventro-cephalic margin of cephalic femora armed with a row of heavy proximal spines, succeeded by a row of more slender, shorter, distal spines (type B).

D. Fourth tarsal joint alone bearing a pulvillus. (Tegmina with oblique discoidal sectors, where these are not obliterated by tegminal reduction.)

[17] The species of the genera *Parcoblatta* and *Arenivaga* are not included in the present key. Keys to distinguish the females of these species are given under their respective generic discussions.

EE. Pronotum distinctively and strikingly marked. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. (Size small.)

F. Tegmina considerably reduced, not reaching apex of abdomen, but not truncate. Pronotum shining blackish brown, margined laterad and cephalad with buffy, which band, at the latero-caudal angles, crosses the pronotum before the caudal margin, in this transverse portion being broader..... **Euthlastoblatta abortiva** (Caudell)

FF. Tegmina considerably reduced, truncate. General coloration buffy, beautifully marbled and marked with blackish brown. Pronotum buffy, disk bordered rather narrowly with blackish brown, and with an anchor-shaped marking of this color, the arms of which are cephalad..... **Aglaopteryx gemma** new species

EE. Pronotum not distinctively and strikingly marked. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines: (Size medium small.)

F. Tegmina very slightly reduced, extending beyond apex of abdomen. General coloration warm buff. Head warm buff with inter-ocular-ocellar area prout's brown, broken mesad by twin spots of warm buff. **Latiblattella rehni** new species

FF. Tegmina reduced, not reaching apex of abdomen. General coloration warm buff with an ochraceous tinge. Head warm buff, vertex strikingly pale buff, face maculate with prout's brown. **Latiblattella lucifrons** new species

DD. Four proximal tarsal joints each bearing a pulvillus. (Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Pronotum with caudal margin truncate caudad.)

E. General coloration solid, shining blackish brown, with limbs ochraceous orange. (Tegmina truncate distad, subquadrate pads with sutural margins weakly overlapping. Size medium small.) **Ischnoptera deropeltiformis** (Brunner)

EE. General coloration never solid, shining blackish brown, with limbs ochraceous orange..... **Parcoblatta**[18]

CC. Ventro-cephalic margin of cephalic femora armed with a row of spines which decrease gradually in size and length distad (type A). (Four proximal tarsal joints each bearing a pulvillus.)

D. Supra-anal plate not bilobate.

E. Tegmina not truncate.

F. Tegmina with strongly oblique discoidal sectors. (Size medium small. Tegmina reduced, extending to apex of abdomen. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. General coloration ochraceous-buff. Pronotum with two

[18] A key to the females of the twelve species of this genus is given on page 75.

latero-caudal blotches of deep chestnut brown and with disk ochraceous tawny. Tegmina tinged with cinnamon brown, with a triangular buffy invasion at the apex of the anal field.)

Supella supellectilium (Serville)

FF. Tegmina with longitudinal discoidal sectors.

G. Tegmina with discoidal sectors not angulate at apex of anal field. Antennae not hirsute in basal half.

H. Pronotum not distinctively marked. Size small to very small. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. Tegmina reduced, not reaching apex of abdomen.

I. Size averaging larger, 7 to 9.5 mm. Tegmina normally less reduced, 4.9 to 6 mm.

Cariblatta lutea lutea (Saussure and Zehntner)

II. Size averaging smaller, 5.8 to 8 mm. Tegmina normally more reduced, 3.6 to 5 mm.

Cariblatta lutea minima Hebard

HH. Pronotum distinctively marked with paired, moderately heavy, longitudinal lines of deep mars brown. Size medium small. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Tegmina extending beyond apex of abdomen..... **Blattella germanica** (Linnaeus)

GG. Tegmina with discoidal sectors angulate at apex of anal field. Antennae hirsute in basal half. (Size medium small. Tegmina fully developed, extending beyond apex of abdomen. Pronotum considerably obtuse-angulate produced caudad, with apex rounded. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. General coloration russet to brownish black, pronotum cinnamon rufous, broadly margined with cream color.)

Pseudomops septentrionalis new species

EE. Tegmina truncate distad, (subquadrate pads with sutural margins weakly overlapping. Size medium small. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Pronotum with caudal margin very weakly angulato-produced. General coloration uniform, chestnut to hazel.)..... **Symploce lita** Hebard

DD. Supra-anal plate weakly bilobate. (Size medium small, form depressed. Tegmina and wings fully developed, (normally) falling slightly short of apex of abdomen. Ulnar vein of wings with numerous incomplete rami. Pronotum maroon, bordered laterad and cephalad with warm buff, two rotundato-angulate invasions of this color into the disk on each side and one meso-cephalad.)..... **Leurolestes pallidus** (Brunner)

BB. Subgenital plate valvular, with valves terminating proximad in a transverse sulcus. (Structure of insects heavily chitinous. Femoral spines all heavy (type A). Four proximal tarsal joints each bearing a pulvillus.)

C. Arolia present. Size large.
D. Tegmina much reduced.
E. Tegmina represented by subquadrate pads with sutural margins weakly overlapping. General coloration immaculate, dark claret brown. Pronotum rarely showing traces of lateral yellow bands.
Eurycotis floridana (Walker)
EE. Tegmina represented by small, rounded trigonal, lateral pads. General coloration blackish brown, involutely pictured with buffy.
Neostylopyga rhombifolia (Stoll)
DD. Tegmina little reduced, extending beyond apex of abdomen.
E. Coloration not solid. General coloration reddish brown.
F. Pronotum antimony yellow, with two very large, suffused blotches of chestnut. Tegmina unicolorous.
G. Supra-anal plate with a deep, acute-angulate, median emargination. Cerci very elongate and slender distad. Tegmina and wings averaging more elongate. Size averaging slightly larger.
Periplaneta americana (Linnaeus)
GG. Supra-anal plate with a much less deep median emargination. Cerci not as elongate, not as slender distad. Tegmina and wings averaging less elongate. Size averaging slightly smaller.
Periplaneta brunnea Burmeister
FF. Pronotum ochraceous-buff with an orange tinge, with two large, sharply defined, blotches of black. Tegmina deep bay, with marginal field strikingly ochraceous-buff.
Periplaneta australasiae (Fabricius)
EE. Coloration solid, shining blackish brown.
Periplaneta fuliginosa (Serville)
CC. Arolia absent. Size medium. (Tegmina represented by small, rounded trigonal, lateral pads. General coloration shining blackish brown.)
Blatta orientalis Linnaeus
AA. Ventral margins of femora unarmed, or supplied with few distal spines.[19]
B. Tegmina present. (Median and caudal femora with a disto-dorsal genicular spine.)
C. Subgenital plate simple.
D. Tarsal claws simple. Supra-anal plate weakly bilobate. Ocellar spots present. Four proximal tarsal joints each bearing a pulvillus.
E. Size medium small. Pronotum strongly obtuse-angulate produced caudad, with apex rounded. Arolia present.
F. General coloration brown. Tegmina thickly supplied proximad with minute pits. (Pronotum shining blackish brown margined cephalad,

[19] In *Arenivaga* and *Eremoblatta*, the ventro-cephalic margins of the cephalic femora are alone armed; in the former with chaetiform spines, in the latter with short, conical spines. In *Attaphila fungicola*, the ventro-cephalic margin of the caudal femora alone is supplied with several stout spines.

or with latero-cephalic traces of buffy. Ventral margins of femora all supplied with a single, stout, distal spine.)

Pycnoscelus surinamensis (Linnaeus)

FF. General coloration light paris green. Tegmina not pitted. (Ventral margins of femora frequently with a single, reduced, distal spine on all, or some, of these margins, or unarmed.)

Panchlora cubensis Saussure

EE. Size extremely large. Pronotum subelliptical. Arolia absent. (Coloration blackish brown and buffy. Pronotum buffy, with a large, shield-shaped, shining blackish brown area, in which are striking pale markings. Tegmina, part blackish brown, part buffy. Ventro-cephalic margin of cephalic femora with few, stout, proximal spines, succeeded by a closely set row of stout hairs. All ventral femoral margins with single, stout, distal spines.) ..... **Blaberus craniifer** Burmeister

DD. Tarsal claws specialized, showing on each internal margin two microscopic teeth. Supra-anal plate not bilobate. Ocellar spots absent. Fourth tarsal joint alone supplied with a pulvillus. (Size very small. General coloration buffy. Head with a narrow, transverse line of prout's brown between eyes. Ventral surface of abdomen margined with buffy. Dorsal surface convex, suggesting certain forms of Coleoptera. Wings with a very large appendicular field. Ventral margins of femora, excepting caudal margin of cephalic femora, each supplied with a single, elongate, distal spine. Large arolia present.) ... **Plectoptera floridana** new species

CC. Subgenital plate specialized.

D. Subgenital plate valvular, with bases of valves forming an acute angulation. Insect moderately thickly clothed with hairs. Tegmina opaque proximad; membranous, clear transparent, distad. Wings with unfolded anal field. Ocelli minute, with surfaces convex. Ventro-cephalic margin of cephalic femora supplied with a row of minute, chaetiform spines, terminated by two heavy, elongate, distal spines; other ventral femoral margins unarmed. Four proximal tarsal joints each bearing a pulvillus. (Moderately well developed arolia present.) Size very small. Head and pronotum yellow, with a brownish orange tinge. Opaque portions of tegmina black, with a metallic, green-blue sheen... **Holocompsa nitidula** (Fabricius)

DD. Subgenital plate with a medio-longitudinal, linear cleft distad. Insect smooth. Tegmina delicate, translucent. Wings with folded anal field (and with an appendicular field). Ocelli absent. Ventral margins of femora, excepting caudal margin of cephalic femora, each supplied with a single, elongate, distal spine. Fourth tarsal joint alone supplied with a pulvillus. (Large arolia present.) Size small. General coloration ochraceous-buff.

Chorisoneura texensis Saussure and Zehntner

BB. Tegmina absent. (Tarsal claws simple.)

C. Median and caudal femora with a disto-dorsal genicular spine. (Surface clothed with hairs.)

D. Subgenital plate valvular, with bases of valves forming an acute angulation. Cerci much reduced, articulations apparent, apex acute. (Size very small. Ocelli absent. Ventral femoral margins unarmed.) . . **Compsodes** [20]

DD. Subgenital plate simple. Cerci very greatly reduced, articulations obsolete, apex blunt. (Pulvilli absent.)

E. Ocellar spots absent. Size minute. Ventro-cephalic margin of cephalic femora armed with a single, delicate, distal spine, other ventral margins unarmed, except cephalic margin of caudal femora, which is supplied with several stout spines. Cerci rounded lobes. Large arolia present. (General coloration amber yellow.) . . . . . **Attaphila fungicola** Wheeler

EE. Ocellar spots present, usually very weakly defined. Size large to medium small. Ventral femoral margins unarmed, except for a rather closely set row of short, chaetiform spines in distal half of cephalic margin of cephalic femora. Cerci greatly reduced, blunt conical. Arolia absent. **Arenivaga** [21]

CC. Median and caudal femora lacking a disto-dorsal genicular spine. (Arolia absent.)

D. Subgenital plate simple. Size medium small, form suborbicular. Insect exceedingly hairy. Ocellar spots very weakly defined. Cephalic femora with ventro-cephalic margin bearing a few stout, rather closely placed, conical spines, succeeded distad by a series of very widely spaced, similar spines; otherwise the ventral femoral margins are unarmed, but extremely hairy. Tarsi greatly reduced; pulvilli absent; tarsal claws reduced and scarcely functional. . . . . **Eremoblatta subdiaphana** (Scudder)

DD. Subgenital plate absent, distal portion of abdomen covered by the produced sixth dorsal and ventral abdominal segments. Size medium, form elongate. Insect smooth. Ocelli absent. (Coloration shining blackish brown.) (Pronotum thickened and somewhat hooded cephalad.) Cephalic femora with ventro-cephalic margin armed distad with two or three stout spines, ventro-caudal margins of all femora (normally) armed with two similar distal spines, other ventral femoral margins unarmed. Four proximal tarsal joints heavy, each bearing a pulvillus; tarsal claws heavy. **Cryptocercus punctulatus** Scudder

Acknowledgements

The material treated in the present study totals 5354 specimens, of which 3788 are in the Philadelphia collections.

[20] The female sex is unknown of the single species found in North America, north of the Mexican boundary. The characters here given are of generic significance and are taken from females before us of *Compsodes delicatulus* (Saussure and Zehntner).

[21] A key to the females of the North American species of the Polyphaginae is given on page 217. The four species of *Arenivaga*, found north of the Mexican boundary, are there tabulated.

Our numerous requests for the loan of other entire collections, or important historic examples, have in every instance met with full compliance. Had it not been for this willing and generous cooperation, it would have been impossible to undertake this task. We would here express our deep gratitude to Mr. James A. G. Rehn of the Academy, Mr. A. N. Caudell of the National Museum, Dr. Samuel Henshaw of the Museum of Comparative Zoology, Mr. Charles Schaeffer of the Museum of the Brooklyn Institute of Arts and Sciences, Dr. F. E. Lutz of the American Museum of Natural History, Dr. E. M. Walker of the University of Toronto, Dr. J. Chester Bradley of Cornell University, Mr. F. Sherman Jr. of the North Carolina Department of Agriculture, Prof. C. P. Gillette of the Colorado State Experiment Station and curators of other institutions, and to Dr. A. P. Morse, Mr. William T. Davis, Dr. Henry Fox, Mr. M. P. Somes, Prof. W. S. Blatchley and Mr. Charles S. Brimley, for the opportunity of examining material in their charge or belonging to their collections.

SUBFAMILY PSEUDOMOPINAE

The transition from the Ectobiinae to the present subfamily is almost indefinable.[22] The typical species of the former have the femoral spines very delicate, and the male supra-anal plate very weakly produced. In the Pseudomopinae the femoral spines are heavier, the male supra-anal plate more strongly produced in typical species. The first division of the Ectobiinae (*Ectobius* and allied genera) have also a distinctive facies,[23] the tegminal venation and form being chiefly responsible for this.

In the first species here considered, we may note that several features show close affinity with the first division of the Ectobiinae; careful consideration of all the features, including the general

[22] See Shelford, Trans. Ent. Soc. London, p. 231, (1906), and Gen. Ins., Fasc. 55, Blattidae, Ectobinae, p. 6, (1907). That author later admits that attempts to define the Ectobiinae and Phyllodromiinae (=Pseudomopinae) have all been unsuccessful, Gen. Ins., Fasc. 73, Blattidae, Phyllodromiinae, p. 2, (1908).

[23] The forms of the second division of the Ectobiinae (*Anaplecta* and allied genera), have a general facies resembling in many ways *Plectoptera* and its allies, which are generally referred to the Oxyhaloinae, and are separated from those forms only by the different character of tegminal venation, wing plication and absence of delicate femoral spines.

facies, convinces us that, though representing one of the nearly intermediate genera, this insect belongs properly in the Pseudomopinae.

The Group Blattellites

The species of this group are all delicate, this particularly evidenced in the tegminal structure. The tegmina have their discoidal sectors longitudinal, weakly oblique or decidedly oblique to the discoidal vein. The wings have the ulnar vein with rami all complete to the distal margin.

In order to place correctly the North American species of this, the first and largest, group of the Pseudomopinae, we have been obliged to examine carefully our considerable series from the subtropical and tropical regions, south of the southern limits of the United States. The far greater portion of this material is as yet unrecorded, and, during the preparation of the present paper, only such work has been done as was necessary to determine the correct relationship of the forms related to, or confused with, those found over that portion of the continent at present under consideration. Several features of decided importance should, however, be stated here concerning this material.

There is absolute proof that unusually great numbers of species yet undescribed of this group exist in tropical America; all have excellent structural characters, but in the males of different species the genitalic features and secondary sexual modifications of the abdomen are particularly complex and valuable. The group is difficult and almost the despair of the systematist, this latter fact due almost wholly to a universal practice in the past of describing species briefly, usually with no reference to any of the characters of major importance, this naturally resulting in frequent subsequent misidentifications. Until the types of all the old species are fully described, or topotypic material secured (which can often solve such problems), the tropical American species should, whenever treated, be given full and careful consideration with reference to genitalic and other features of importance, mere records in some cases only adding to the difficulties now existing.

Were more than a small portion of the species of this group conspicuously marked, this would not be so imperative, but in the present group widely separated species of plain coloration often bear to each other an astonishing similarity in superficial appearance.

The enormous number of species and complexity of development makes generic differentiation most difficult in the present group. No single major feature may safely be used for this purpose, but the sum total of important characters found in groups of species should be employed; this of course being the only safe method in any systematic study. That Shelford's generic discussion and erection of five new genera in the present group was hastily done, and far too superficial, is evident.[24]

Of the numerous genera which should properly be referred to the Blattellites, nine valid genera are known from the New World; of these *Blattella* and *Supella* are cosmopolitan,[25] *Ceratinoptera*, *Dendroblatta* and *Neoblattella* are tropical American, never occurring native in the United States, while members of the genera *Euthlastoblatta*, *Aglaopteryx*, *Latiblattella* and *Cariblatta* are native in the United States. We do not believe *Liosilpha* to be a member of the present group, the type of which genus, *pumicata* of Stål, was described from Brazil. So aberrant is *Ceratinoptera* that it may be separated from this group when further study has been accomplished.

The described genera apparently involved, or which have been referred to the present complex, we list below.

	Genotype.	Habitat of Genotype.	Generic Position.
1865. *Ceratinoptera* Brunner	*picta* Brunner	Tropical America	Group Blattellites
1868. *Paraceratinoptera* Saussure (Synonymized under *Ceratinoptera* by Hebard.)			

[24] Ent. Monthly Mag., 2d ser., xxii, p. 154, (1911).

[25] The first is generally distributed throughout the tropics and temperate regions, the second only throughout the tropics. A single species of each genus is known from the New World, in each case being domiciliary.

		Genotype.	Habitat of Genotype.	Generic Position.
1869.	*Pseudectobia* Saussure[26]	*luneli* Saussure	India	Subf. Ectobiinae
1874.	*Liosilpha* Stål	*pumicata* (Stål)	Brazil	Not group Blattellites
1895.	*Mallotoblatta* Saussure and Zehntner	*pilosella* S. & Z. (here selected)	Madagascar	Subf. Ectobiinae
1895.	*Desmosia* Bolivar	*alluaudi* Bolivar	Seychelles	Group Blattellites
1895.	*Mareta* Bolivar	*conspicienda* (Stål)	Seychelles	Group Blattellites
1897.	*Onychostylus* Bolivar			
	(Synonymized under *Mareta* by Shelford.)			
1903.	*Blattella* Caudell	*germanica* (Linnaeus)	Cosmopolitan	Group Blattellites
1911.	*Neoblattella* Shelford	*adspersicollis* (Stål)	Tropical America	Group Blattellites
1911.	*Margattea* Shelford	*ceylonica* (Saussure)	Ceylon	Group Blattellites
1911.	*Supella* Shelford	*supellectilium* (Serville)	Cosmopolitan	Group Blattellites
1911.	*Eoblatta* Shelford	*notulata* (Stål)	Tahiti	Group Blattellites
1911.	*Chorisoblatta* Shelford	*liturifera* (Stål)	Mauritius	Group Blattellites
1916.	*Cariblatta* Hebard	*punctulata* (Beauvois)	Tropical America	Group Blattellites
1916.	*Dendroblatta* Rehn	*sobrina* Rehn	Tropical America	Group Blattellites
1917.	*Euthlastoblatta* new genus	*abortiva* (Caudell)	South-central United States	Group Blattellites
1917.	*Latiblattella* new genus	*rehni* new species	Southern Florida	Group Blattellites
1917.	*Aglaopteryx* new genus	*gemma* new species	Southeastern United States	Group Blattellites

Many generic units in the group Blattellites unquestionably occur in the New World, and many others in the Old World, which have not yet been described.

EUTHLASTOBLATTA[27] new genus

This genus is an aberrant member of the subfamily Pseudomopinae, as discussed on page 23. No closely related genera are known.

[26] The only connection this name has with the present group is that Saussure and Zehntner described *Theganopteryx* (*Pseudectobia*) *antiguensis*, which has recently been found to be a synonym of *Cariblatta insularis* (Walker). Hebard, Trans. Am. Ent. Soc., xlii, p. 175, (1916).

[27] From εὔθλαστος = fragile.

The general appearance and distinctly oblique discoidal sectors of the tegmina would suggest affinity to *Ceratinoptera* sensu strictiore,[28] but the important characters of supra-anal plate, form of limbs, armament of ventro-cephalic margins of cephalic femora and presence of arolia, show wide separation from that likewise distinctive and anomalous genus. With the succeeding genus, *Aglaopteryx*, agreement is found in the very delicate structure, unmodified dorsal surface of male abdomen, more transverse male supra-anal plate than is usual in the group and arrangement of pulvilli, but decided difference is found in the general facies, contour and male genitalia.

The single species, here discussed, occurs in the Brownsville region of Texas.

Genus monotypic. GENOTYPE: *Euthlastoblatta abortiva* [*Anaplecta abortiva*] (Caudell).

Generic Description.—The sexes show moderate differences in size and form. Head not very elongate, evenly rounded; inter-ocular space broad; inter-ocular-ocellar area not flattened; ocellar spots weakly defined. Antennae setaceous. Tegmina when fully developed[29] delicate in structure, discoidal sectors oblique, numerous (ten usual), weakly defined and scarcely distinguishable from parallel channels in each intervening area. Wings when fully developed with area of costal veins broad, these veins enlarged in distal fourth, distal margin of anterior field rather broadly rounded,[30] rami of ulnar vein few. Dorsal surface of male abdomen unspecialized. Supra-anal plate in both sexes strongly transverse, little produced. Limbs stout. Cephalic femora with ventro-cephalic margins armed proximad with a few moderately stout spines, between the more distal of which are situated a few minute piliform spines, these succeeded by a closely set row of minute piliform spines which occupy fully half this margin, succeeded by two long spines of which the more distal is the longest;

[28] See Hebard, Trans. Am. Ent. Soc., xlii, pp. 125 to 134, (1916).

[29] In the only described species the tegmina are fully developed in the male, decidedly reduced in the female.

[30] This is more decided than in the majority of the American species of the Blattellites. This character is used in separating the Ectobiine genera *Theganopteryx* and *Eutheganopteryx*. See Shelford, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersbourg, xvii, p. 56, (1912).

ventro-caudal margin unarmed except for a shorter distal spine. Median and caudal femora with ventral margins armed with irregularly placed, moderately strong spines and distad with a single spine. Tarsal joints elongate; first three without pulvilli; fourth small, quadrate, with pulvillus occupying all of ventral surface. Arolia present, distinct but small.

Euthlastoblatta abortiva (Caudell) (Plate I, figures 1 to 8.)

1904. *Anaplecta abortiva* Caudell, Mus. Brooklyn Inst. Arts and Sci., Sci. Bull., i, p. 105. [♀, Esperanza Ranch near Brownsville, Texas.]

1913. *Phyllodromica abortiva* Caudell, Proc. U. S. Nat. Mus., xliv, p. 600, fig. 9, p. 603. (Same specimen.)

At first glance the color pattern of this beautiful species suggests that of certain species of *Pseudomops;* it is, however, on closer examination found to be of an entirely different type.

The strongly transverse supra-anal plate, weaker spines of the femoral margins than is usual in the present subfamily and reduced tegmina of the female, led Caudell, who had that sex alone before him, to consider the species a member of the Ectobiinae, as shown in the above references.

The species is very distinct from any of the other forms here treated.

As the male of this species was previously unknown, we here describe a topotypic male, a specimen secured with the type.

Description of Male.—(Esperanza Ranch near Brownsville, Texas.) Size small, form moderately slender. Interocular space broad, slightly narrower than the broad interantennal space, ocellar spots distinct but irregular. Maxillary palpi elongate, with distal joint enlarging decidedly. Pronotum weakly convex, showing a slight latero-caudal discal flattening; outline elliptical, showing a distinct caudal truncation, point of greatest width meso-caudad. Tegmina and wings fully developed, extremely delicate in structure (see generic description). Tegmina with margins of mesal third parallel; apex broadly rounded; mesal field occupying but one-third of costal margin. Supra-anal plate very strongly transverse; dorsal surface weakly concave; very weakly produced between cerci, with free margin transverse, showing a weak convexity and a very feeble median emargination. Within the anal chamber, meso-ventrad, from beneath two large, lateral, chitinous plates, a very wide subchitinous structure, with parts convergent, is produced caudad, with its short, stout, chitinous, distal portion armed above with very thickly set microscopic spines and terminating in a fringe of closely set, curved, spiniform hairs, arranged in a whorl. (Plate I, figs. 4 and 5.) The apex of this remarkable process is consequently flat and normally is carried resting just within the median emar-

gination of the subgenital plate, between the styles. Subgenital plate with surface rather strongly convex, somewhat asymmetrical; lateral margins elevated, sinistral weakly concave, dextral moderately concave, to brief distal portion, which is decidedly asymmetrical and concave ventrad; at the apices of the plate are situated small styles, slightly longer than wide, rounded and armed dorsad with numerous, separated, minute, short, stiff hairs.

Characters of Female.—Type. (Esperanza Ranch near Brownsville, Texas.) Agrees with male except in the following features. Form distinctly more robust. Interocular space very broad, slightly broader than the very broad interantennal space, ocellar spots weakly defined. Pronotum more ample, weakly convex, without trace of discal flattening; caudal truncation greater, point of greatest width caudad.[31] Tegmina slightly more corneous in structure, decidedly reduced, not reaching distal segments of abdomen; costal and sutural margins arcuato-convergent distad to moderately broadly rounded apex, which is situated mesad; discoidal sectors fewer (due to the tegminal reduction) and even more weakly defined. Wings strongly atrophied, padlike, but folded at juncture of anterior and posterior fields, reaching to median segment. Supra-anal plate strongly transverse, not as much so as in male, weakly triangularly produced, with apex feebly emarginate, showing indications of a weak medio-longitudinal sulcation. Subgenital plate weakly convex, extensively deplanate meso-distad, free margin broadly convex and showing a very weak flattening at the cercal bases.

Measurements (in millimeters)

Brownsville, Texas ♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Described Topotype	9.5	2.7	3.9	10.8	3.8
Topotypes.....(7)	9.8–10.4	2.8	4–4.2	10.6–11.2	3.8–4
♀					
Type.....	8.7	3	4.3	6.2	3.2
Topotypes.....(2)	10.2–10.5	3–3.1	4.4–4.6	6.2–6.4	3.3–3.6

Coloration. Pronotum shining blackish brown, strikingly marked with buff (Plate I, Figs. 1 and 6). Dorsum of abdomen shining blackish brown. Tegmina: male, translucent shining sudan brown, gradually becoming paler in shade toward the margins; female, translucent shining deep argus brown, much paler toward costal margins, particularly proximad. Wings hyaline, with veins almost colorless. Head tawny, eyes blackish brown. Antennae, ocellar spots, maxillary palpi and limbs ochraceous-tawny. Ventral surface of body varying in different specimens from blackish to suffused tawny.

[31] This condition clearly accompanies reduction in the tegmina.

Immature examples have the buff portions of the pronotum relatively somewhat more extensive than in the adults, while the mesonotum and metanotum are also of this color, broadly margined caudad with the dark brown general coloration of the dorsal surface. In some individuals, the lateral margins of the proximal dorsal abdominal segments, the caudal margins of the last two dorsal abdominal segments, the supra-anal plate and the cerci are also of the paler coloration. Beneath, these examples are usually almost uniform, rather pale brown.

In the vicinity of Brownsville, the species was found not uncommon in rats' nests, *Neotoma* sp., under the dense tangle of bushy vegetation, palms and vine tangles, growing near the Rio Grande. In this environment, it was also found in the leaves and dry litter on the ground, and one immature example was taken from the dead petiole of a palm, hanging from the tree.

The species is known only from the material here studied.

Specimens Examined: 18; 8 males, 3 females and 7 immature males.

Brownsville, Texas, V, 7, 1907, (H. S. Barber), 3 juv. ♂, [U. S. N. M.].

Fort Brown, Brownsville, Tex., VIII, 5, 1912, (Hebard; in rats' nests), 6 ♂, 3 juv. ♂, [Hebard Cln.].

Piper Plantation, near Brownsville, Tex., VIII, 3, 1912, (Rehn and Hebard; in leaves and dry litter), 1 ♂, 2 ♀, [A. N. S. P. and Hebard Cln.].

Esperanza Ranch, near Brownsville, Tex., VI and VIII, 4, 1904, (C. Schaeffer), 1 ♂, 1 ♀ *type*, 1 juv. ♂, [Bklyn. Inst.].

AGLAOPTERYX [32] new genus

The present genus shows type B[33] armament of the ventrocephalic margin of the cephalic femora, rather strongly deplanate head, widely separated eyes, tegmina with oblique discoidal sectors[34] (these formed by the median vein, its branches and the ulnar vein) and dorsal surface of male abdomen not specialized.

[32] From ἀγλαός = beautiful and πτέρυξ = wing.

[33] As generally understood for the Pseudomopinae; type A, indicates that the ventrocephalic margins of the cephalic femora are armed with a series of spines, all of similar general character; type B, that the series of spines is abruptly contrasted, the more proximal being elongate and heavy, the more distal minute and very slender.

[34] This can not be observed in *A. gemma*, due to the reduction of these organs. The less reduced tegmina of *A. diaphana* are, however, otherwise very similar and show clearly this feature.

The genus shows nearest relationship to *Mareta*,[35] *Euthlastoblatta* and *Dendroblatta*,[36] the stouter limbs, however, show rather a development toward the type found in *Ceratinoptera*.[37] Though distinct, closer affinity with *Dendroblatta* is indicated.

The genus is apparently confined in distribution to the southeastern United States, the Bermudas, Bahamas and West Indies; it includes two species, *diaphana* (Fabricius) and *gemma* here described.

GENOTYPE: *Aglaopteryx gemma* new species.

Generic Description.—The sexes show but little differences in size and form. Size medium small, form rather broad, structure very delicate for the group. Head broad, eyes widely separated, face evenly and weakly convex, lateral margins from eyes to bases of jaws decidedly convergent. Maxillary palpi short for the group, with last joint as long as, to longer than, penultimate joint. Development of organs of flight of equal degree in both sexes. Tegmina moderately reduced[38] or abruptly truncate,[39] with discoidal sectors, when present, oblique. Wings moderately reduced or absent, when present with venation rather irregular, few costal veins but little enlarged distad and intercalated triangle very small. Dorsal surface of male abdomen not specialized; supra-anal plate very small, transverse, weakly produced; cerci rather short, deplanate above, with about twelve joints. Cephalic femora rather stout; ventro-cephalic margin of same with or without a few long, stout spines proximad, distad always with a closely set row of minute spines, terminated by two very elongate spines. Ventro-caudal margin of cephalic femora unarmed, except for one or two distal spines; ventral margins of median and caudal femora supplied with elongate, moderately stout spines. Tarsal joints appreciably more elongate than in *Euthlastoblatta*, not as decidedly elongate as in *Dendroblatta*, pulvilli similar in these genera. Distinct but small arolia present.

[35] Described by Bolivar, Ann. Soc. Ent. France, lxiv, p. 371, (1895).

[36] Described by Rehn, Trans. Am. Ent. Soc. xlii, p. 231, (1916).

[37] Described by Brunner, Nouv. Syst. Blatt., p. 75, (1865). For definite restriction of this genus see Hebard, Trans. Am. Ent. Soc., xlii, p. 125, (1916).

[38] In *A. diaphana*.

[39] In *A. gemma*.

Aglaopteryx gemma new species (Plate I, figures 9 to 12.)

The present species has been incorrectly recorded as "*Ceratinoptera*" *diaphana*[40] to which it is closely allied; it is found to differ from that insect, however, in the anchor shaped, not transverse, bar of the dark marking in the pronotal disk; the more reduced and sharply truncate tegmina; absence of wings; dorsal surface of abdomen beautifully maculate with blackish brown, pale red-

[40] **Aglaopterym diaphana** (Fabricius)

1792. *B[latta] diaphana* Fabricius, Ent. Syst., ii. p. 11. [Islands of South America (West Indies).]

Ceratinoptera diaphana of Brunner and subsequent authors.

This species has been recorded by various authors from the West Indies; all records from the United States by Rehn and Hebard and by Davis (excepting that from Big Pine Key, Florida, which was based on an immature example of *Latiblattella rehni*) apply to *A. gemma*.

In this species the bar of the dark marking in the pronotal disk is normally transverse; the tegmina are reduced, extending slightly beyond, to falling distinctly short of, the apex of the abdomen, but never truncate distad; the wings are present but reduced; the dorsal surface of the abdomen is normally very dark, narrowly margined with buffy; the male subgenital plate is distinctive. This plate is small, convex, irregularly produced, with two large, irregular concavities mesad on the distal margin, occupied by broad styles; the sinistral a brief lobe, broader than long; the dextral large and flattened, with mesal extremity produced in an elongate finger, about three times as long as broad, with tapering but blunt apex directed sinistrad; mesad between the styles the plate is briefly and narrowly produced, this almost equal in length to the sinistral style, while between this and the dextral style is situated an elongate, slender, chitinous, almost straight, sharply pointed projection, extending as far distad as sinistral style. The cephalic femora have the ventro-cephalic margin with distal spines even more elongate than in *gemma*, two or three in number; the ventro-caudal margin is often supplied with other spines beside the distal one.

These observations are based on the following material now before us.

Paget West, Bermuda, I, 2 to V, 17, 1909, (F. M. Jones), 3♂, 3♀, 1 juv. ♂, 2 juv. ♀, 2 very small juv. ♀, [A. N. S. P. and Hebard Cln.].

Hamilton, Bermuda, II, 24, 1910, (E. G. Vanatta), 1 very small juv. ♂, [A. N. S. P.].

Mona Island, Porto Rico, II, 21 to 26, 1914, (in a dead branch, ten feet above ground), 1 juv. ♀, [Am. Mus. Nat. Hist.].

Montego Bay, Jamaica, X, 29, 1913, (Hebard; in bromeliad on forest tree with *Nyctibora laevigata* and numerous *Cariblatta insularis*), 1 ♀, [Hebard Cln.].

Long Ditton, Dominica, VI, 19, 1911, (Crampton and Lutz), 1 ♀, [Am. Mus. Nat. Hist.].

Easy Hall, Barbados, IX, 24, 1902, (H. M. Lefroy), 1 ♀, [A. N. S. P.].

Of this material, the specimen from Jamaica is small and has no markings within the pronotal disk, that from Dominica is unusually large, while that from Barbados has the proportionately longest tegmina of the series.

dish brown and buffy; very different and more decidedly specialized male subgenital plate and styles, and caudal margin of cephalic femora, which are armed only with a single distal spine.

Type.—♂; Mobile, Alabama. August 26, 1915. (Rehn and Hebard.) [Hebard Collection, Type no. 419.]

Description of Type.—Size small, form rather broad, structure very delicate. Head as given in generic description; interocular space broad but distinctly narrower than the very broad interantennal space; ocellar spots very weakly defined. Maxillary palpi with third and fifth (distal) joints subequal in length, fourth slightly shorter. Pronotum with cephalic margin transverse, lateral margins broadly convex and moderately divergent caudad, caudal margin transverse, very weakly convex mesad and very weakly concave meso-laterad; cephalic angles very broadly rounded obtuse-angulate, caudal angles rather broadly rounded and nearly rectangulate. Exposed portion of tegmina subquadrate, longer than wide, but extending only slightly beyond margin of first dorsal abdominal segment; costal margin very broadly and evenly rounding, at slightly more than a right angle, to sutural margin, which is nearly straight, angle at sutural margin sharply rounded, rectangulate. Seventh and eighth dorsal abdominal segments very narrow and with only caudal margins showing. Supra-anal plate small, transverse, triangularly produced, with lateral margins weakly concave and apex truncate. Cerci not very elongate, twelve jointed, tapering rather sharply distad to acute apex, deplanate above, convex below with decidedly narrow, flattened lateral margins. A mass of subchitinous tissue fills the proximal portion of the anal chamber, from which project mesad, from a chitinous base, two minute, chitinous spines, directed dorsad and curving weakly dextro-caudad. Subgenital plate convex, distad with surface divided into two convex portions terminating in broad sockets, in these rest the very broad and short styles,[41] which are almost completely fused with the plate; sinistral style, a low rounded ridge several times as broad as long and not projecting beyond the lateral margin of the plate; dextral style, a thick, corneous, rounded projection, on the inner margin about twice, on the outer three times, as long as wide, straight, directed diagonally mesad, with apex blunt and not narrowing; this style is strongly concave within and could almost be termed hollow, while in this orifice is situated a moderately stout, chitinous projection, about twice as long as broad, the blunt apex of which does not project beyond the apex of the style; between the styles the brief mesal portion of the distal margin of the plate is weakly and irregularly produced.[42] Limbs and armament of same as given in generic description. Ventro-caudal margin of cephalic femora with only a single spine, this situated distad.

[41] The simple styles in immature males of the present species are heavier than those in the corresponding instars of *diaphana*.

[42] This development is evidently a decidedly greater specialization of structures homologous to those found in *diaphana*.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with type except in the following features. Size slightly larger, form slightly broader. Supra-anal plate very slightly larger than in male, with lateral margins a little less concave, mesad deeply and narrowly cleft for half its length. Subgenital plate ample and convex, little produced and decidedly broader than long; free margin convex, but very weakly concave at cerci.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Mobile, Alabama, *type*		8.7	2.9	4	3.8	2.8
Mobile, Alabama, *paratypes*	(19)	8–8.8	2.8–2.9	3.8–4	3.6–3.8	2.7–2.9
River Junction, Florida	(5)	8.1–8.9	2.7–2.9	3.8–3.9	3.6–3.7	2.5–2.7
Ortega, Florida	(1)	7.5	2.7	3.8	3.5	2.3
♀						
Mobile, Alabama, *allotype*		9	3.1	4.3	4	3
Mobile, Alabama, *paratypes*	(23)	8–9.3	2.9–3.2	3.9–4.3	3.7–4.1	2.7–2.9
River Junction, Florida	(5)	8.6–9.7	3–3.2	4.1–4.3	3.8–3.9	2.7–2.9
Floyd's Island, Georgia	(1)	9.1	2.9	4	3.6	2.7
Miami, Florida	(1)	9.3	3	4.3	3.7	2.7

Very little size variation is found to occur, this entirely irrespective of geographic distribution.

Coloration.—Head ochraceous-buff to ochraceous-tawny, with a broad band of dark chestnut brown between the eyes; in several specimens from extreme southern Florida before us, this marking is continued on the face, forming a large triangular blotch, with a small additional marking at its apex at the clypeal suture. Pronotum transparent buffy; disk marbled with very weak ochraceous orange, bordered rather narrowly with blackish brown, this marking broader and solid caudad to the caudal margin of the pronotum, disk further marked with this color in the shape of an anchor, the two adult females from extreme southern Florida and four of the Bahaman adults have this marking subobsolete. Tegmina

transparent buffy, the anal field bordered with blackish brown, this heavy along the anal sulcus, continued distad along the remaining brief portion of the sutural margin. Dorsal surface of abdomen blackish brown in lateral fourth, finely marbled with buffy and very weak ochraceous orange; mesal half, including supra-anal plate, buffy, finely marbled with weak ochraceous orange and, in intensive condition, with blackish brown. Limbs and underparts buffy: male with lateral margins of coxae very finely and of abdomen narrowly, blackish brown, the abdomen becomes hazel toward, and including, the subgenital plate; female generally similar, except that the abdomen is very broadly margined laterad with blackish brown, the mesal portion and subgenital plate deep hazel. The females show an average more intensive coloration than do the males. The palest female before us (Floyd's Island, Georgia) has the darkest shades of the dorsum of the abdomen cinnamon rufous.

In the young the color pattern is similar, but with the lines more delicate; the mesonotum and metanotum are narrowly margined caudad with blackish brown.

Ootheca.—This is carried with suture dorsad in position. It is very small, 4.8 mm. in greatest length and 2.8 mm. wide. The sides have each about thirty fine, parallel, longitudinal ridges. The suture is supplied with eighteen well spaced, blunt knobs.

Over its range the species was often found under signs on trees. When exposed, individuals ran over the tree trunk with really astonishing rapidity.

The present species is widely distributed over the southeastern United States, the single Bahaman record given below representing its only known occurrence elsewhere. In addition to part of the material here recorded, the species has been incorrectly recorded as ***diaphana*** from Billy's Island in the Okeefenokee Swamp, Georgia and from Newberry and Gainesville, Florida.

Specimens Examined: 102; 40 males, 47 females, 4 immature males, 5 immature females and 6 very small immature examples.

Houston, Texas, VIII, 12, 1915, (Hebard; in Spanish moss, *Tillandsia*, on oak), 1 juv. ♀, [Hebard Cln.].

Beaumont, Tex., VII, 23, 1912, (Hebard; beaten from undergrowth of pine forest and under sign on oak near river), 2 juv. ♂, [Hebard Cln.].

Lafayette, Louisiana, VIII, 9, 1915, (Rehn and Hebard; under sign on oak), 1 juv. ♀, [Hebard Cln.].

Hattiesburg, Mississippi, IX, 11, 1915, (Rehn and Hebard; under sign on sweet gum), 2 ♀, [Hebard Cln.].

Mobile, Alabama, VIII, 26, 1915, (Rehn and Hebard; common under signs on long-leaf pines), 20 ♂, 24 ♀, *type*, *allotype*, *paratypes*, 1 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

Springhill, Mobile County, Ala., VIII, 25, 1915, (Rehn and Hebard; under sign on oak), 7 ♂, 5♀, *paratypes*, 1 juv. ♂, [Hebard Cln. and A. N. S. P.].

Dothan, Ala., IX, 6, 1915, (Rehn and Hebard; under sign on red oak), 3 ♂, [Hebard Cln. and A. N. S. P.].

Bainbridge, Georgia, IX, 5, 1915, (Rehn and Hebard; under sign on water oak), 2 ♂, 2 ♀, [Hebard Cln. and A. N. S. P.].

Floyd's Island, Okeefenokee Swamp, Ga., XII, 27 to 30, 1913, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Pensacola, Florida, III, 1878, 1 ♀, [M. C. Z.].

River Junction, Fla., VIII, 31, 1915, (Rehn and Hebard; under one sign on oak), 5 ♂, 5 ♀, of these 1 with ootheca, [Hebard Cln. and A. N. S. P.].

Ortega, Duval County, Fla., IX, 6, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

Miami, Fla., III, 3, 1916, (Hebard; red mangrove swamp, *Rhizophora mangle*, climbing on roots in afternoon[43]), 1 ♀; III, 4, 1915, (Hebard; Brickell's Hammock, under loose bark on trunk of tree, *Exothea paniculata*, in dense jungle), 1 juv. ♀, [both Hebard Cln.].

Long Key, Monroe County, Fla., III, 13, 1910, (Hebard; under fibers near head of standing cocoanut palm), 1 juv. ♀, 1 very small juv. [Hebard Cln.].

Key West, Fla., I, 20, 1904, (Hebard; under limestone boulder in keys scrub), 1 ♀, [Hebard Cln.].

Nassau, New Providence Island, Bahamas, I, 31 and II, 4, 1905, (A. E. Wright), 2 ♂, 5 ♀, 5 juv., [Morse Cln. and U. S. N. M.].

LATIBLATTELLA new genus

A number of species are here included,[44] some of which show a decided superficial resemblance to certain species belonging to the

[43] Though taken in this very dark situation, the coloration of this specimen is not unusually intensive.

[44] In the collections before us, *rehni*, *lucifrons*, *inornata*, *pavida*, *zapoteca*, *vitrea*, *dilatata* and additional undescribed forms are properly referred to *Latiblattella*. In addition, it is clear from the literature that *chichimeca* and *maya*, both of Saussure and Zehntner, are members of this genus.

genus *Neoblattella*[45] as recently restricted.[46] From the latter, they are readily separable by the oblique discoidal sectors of the tegmina, type B armament of the ventro-cephalic margins of the cephalic femora, greatly specialized dorsal surface of the male abdomen and other features. Nearest relationship to *Eoblatta* appears to exist.[47]

This genus appears to be confined to tropical America, extending its distribution northward to the extreme southern borders of the United States where a tropical element is found.

It is of interest to note that not a species of the genus is known, or represented in the large collections before us, from the West Indies, though from northern Mexico southward on the continent many occur.

GENOTYPE: *Latiblattella rehni* new species.

Generic Description.—The sexes show weak to very decided differences in size and form.[48] Size moderately large to medium, form moderately broad to very broad, for the group. Head with eyes well separated; inter-ocular-ocellar area distinctly flattened; lateral margins of face distinctly convergent ventrad. Maxillary palpi less elongate than in *Neoblattella*, with distal joint slightly shorter than, to slightly longer than, penultimate joint.[49] Tegmina (in fully developed condition, found in numerous species only in the male) delicate, moderately broad, with costal and sutural margins straight and subparallel in greater part, scapular field very broad; discoidal sectors numerous (usually, including their branches, eight

[45] Shelford's insufficient description has led Caudell to consider *Neoblattella* synonymous with *Blattella*. (Proc. U. S. Nat. Mus. xliv, p. 603, footnote 1, (1913).) The two species mentioned there by Caudell represent, however, not *dilatata* and *adspersicollis* as was then supposed, but the two new and distinct species here described in the present new genus.

[46] Hebard, Trans. Am. Ent. Soc., xlii, p. 148, footnote 3, (1916).

[47] When compared with the description of the genotype of *Eoblatta*—*notulata*—described from Tahiti, we find that in *Latiblattella* the discoidal sectors of the tegmina are decidedly less oblique, the marginal and scapular fields of the tegmina are narrower and the sexes approximate each other less closely. From our general knowledge of the group, we feel certain that other undescribed characters, of excellent diagnostic value, will be found to occur in *Eoblatta*.

[48] This appears to accompany reduction in the tegmina in the female, in which sex alone such reduction is found in the known species of the genus.

[49] In *Neoblattella*, the third and fourth joints are each normally much longer than the distal joint of the maxillary palpi.

to ten), moderately oblique.[50] Wings hyaline; costal veins very feebly clavate distad; intercalated triangle small but evident. Tegmina slightly to very greatly reduced in female. Dorsal surface of male abdomen with sixth segment specialized mesad; succeeding segments, (in majority of species), transversely distinctly constricted. Subgenital plate of male fusing and specialized with styles. Subgenital plate of females produced.[51] Cephalic femora with ventro-cephalic margin armed with three to six long, stout spines, succeeded distad by a row of minute, well spaced, piliform spines, terminating in three heavy, elongate, distal spines in increasing ratio. Ventro-caudal margin of cephalic femora and ventral margins of median and caudal femora supplied with elongate, moderately stout spines. First three tarsal joints supplied distad with small pulvilli,[52] brief ventral surface of fourth joint occupied by a pulvillus. Moderately large arolia present.

Latiblattella rehni[53] new species (Plate I, figures 13 to 17.)

1905. *Blattella adspersicollis* Rehn and Hebard, (not *Blatta adspersicollis* Stål, 1860), Proc. Acad. Nat. Sci. Phila., 1905, p. 32. [Miami, Florida.]

1912. *Neoblattella adspersicollis*[54] Rehn and Hebard, (not *Blatta adspersicollis* Stål, 1860), Proc. Acad. Nat. Sci. Phila., 1912, p. 239. [Miami and Homestead, Florida.]

1914. *Neoblattella detersa* Rehn and Hebard, (not *Blatta detersa* Walker, 1868), Proc. Acad. Nat. Sci. Phila., 1914, p. 379. [Homestead, Florida.]

1914. *Neoblattella detersa* Rehn and Hebard, (not *Blatta detersa* Walker, 1868), Journ. N. Y. Ent. Soc., xxii, p. 98. [Lakeland and Everglade, Florida.]

1914. *Ceratinoptera diaphana* Davis, (not *Blatta diaphana* Fabricius, 1792), Journ. N. Y. Ent. Soc., xxii, p. 192. [juv.] [Big Pine Key, Florida.]

The confusion in the present group explains the above misidentifications.[55]

[50] The discoidal sectors are by no means as strongly oblique as in *Supella*.

[51] Never very strongly produced mesad, as in females of many species of *Neoblattella*.

[52] In *L. dilatata* these pulvilli are more extensive, larger than in *L. rehni* or *L. lucifrons*.

[53] We take great pleasure in naming this species, of particular interest in its distribution, for our most intimate friend and co-worker, Mr. James A. G. Rehn.

[54] We have now before us material of *adspersicollis* which can be determined with certainty. It is a very large South American insect, genotype of *Neoblattella*, and is closely related to *N. nahua*, but readily separated from that tropical North American and West Indian species, material of which we have also studied, by excellent genitalic characters.

[55] All of the material upon which these were based is now before us and is listed below.

Superficially the resemblance of this species to *N. detersa*[56] is remarkable; in the present insect the tegmina are, however, not as long in the female as in the male, while the two species are widely separated by a number of structural characters of the greatest importance.

This species appears to stand first in the genus; the arrangement of the recognized species which should be placed here, is given in footnote 44.

Type.—♂; Miami, Dade County, Florida. February 7, 1904. (M. Hebard; edge of town under sign on pine, *Pinus caribaea.*) [Hebard Collection, Type no. 406.]

Description of Type.—Size medium, form moderately broad. Head with interocular space equalling half that between antennal sockets; ocelli distinct; interocular-ocellar area distinctly flattened; very small circular areas, with surfaces feebly convex, occur meso-ventrad and adjacent to the antennal sockets. Maxillary palpi with distal joint large, very slightly longer than penultimate joint and nearly as long as third joint. Pronotum but little convex; greatest width meso-caudad; transparent lateral areas but weakly declivent; cephalic margin of pronotum broadly convex, rounding broadly into transverse caudal margin. Tegmina elongate, moderately broad; very delicate in structure; veins very numerous but weakly defined, numerous discoidal sectors (8 often) weakly oblique to sutural margin. Wings very delicate, with veins and some cross-veinlets weakly darkened; costal veins very feebly clavate distad. Abdomen with proximal dorsal segments unspecialized; sixth with a sudden, deep, semicircular depression mesad which touches the cephalic margin, face of depression there supplied with a scant fringe of hairs, immediately caudad of this point the segment is raised in a large blunt knob, with surface covered cephalo-dorsad with a heavy tuft of somewhat agglutinated hairs of equal length, caudad of this knob the segment is subchitinous in texture and shows a weak emargination of the caudal margin, latero-caudal angles of this segment moderately acute-angulate produced with apex bluntly rounded; seventh segment almost hidden; eighth segment no broader and less chitinous in exposed portion, so that the supra-anal plate is clearly visible beneath. Supra-anal plate transverse, triangularly weakly produced with apex rather broad and blunt. Ventro-mesad, within the anal chamber, a soft integument projects from base of subgenital plate, with filaments converging distad and at its apex, just within the median specialization of the subgenital plate, bearing a minute chitinous thorn on the dorsal surface directed caudad and curving ventrad. Dextrad, within the anal chamber, from a moderately elongate, subchitinous integument, projects a slender genital

[56] Topotypic Jamaican series of this distinctive West Indian species, now before us, make it possible for us to give its proper generic position and compare it with the present insect.

hook, curving strongly dorsad then dextrad but with distal portion straight, hollow, with external face convex but with a faint medio-longitudinal sulcus which terminates just before the rounded apex. Subgenital plate not large, somewhat asymmetrical; with two elongate, heavy, inset plates (the styles) lying dorsad along the nearly straight lateral portions of the distal margin (of which the dextral portion is the more strongly produced), produced and adjacent mesad in slender, flattened projections; the disto-mesal portion of the plate slanting upward, triangularly produced, completely filling the space between the proximal portions of these projections; while within, from base of sinistral projection, a somewhat more strongly chitinous, flattened, cylindrical process is directed dorso-caudad, its apex slightly broadening and faintly roughened, with distal margin rounded, situated between the distal portions of the styles,[67] not enlarged and flattened caudad and in an abruptly different plane to the dorsal surface of the shaft as in *L. lucifrons*. Limbs and armament of same as given in generic description.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with type except in the following features. Form slightly broader. Head with interocular space wider, about two-thirds as wide as space between antennal sockets. Tegmina slightly, but appreciably, less elongate, with structure as in male. Dorsal surface of abdomen unspecialized. Supra-anal plate triangular in general outline, with a medio-longitudinal sulcus; lateral margins weakly concave, meso-distad the plate is weakly emarginate. Subgenital plate large, scoop-shaped, extending a little beyond apex of supra-anal plate, lateral portions produced and raised, with margin convex to point where cerci project, there rather decidedly obtuse-angulate, rounded emarginate, with remaining portion of free margin convex to a rather deep, longitudinal, linear cleft meso-distad.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Ojus, Florida, *paratypes*	(5)	10.7–11.8	3–3.3	4.3–4.7	12.6–13.6	3.4–4
Miami, Florida, *type*		11.9	3.1	4.4	13.7	4
Miami, Florida, *paratypes*	(15)	10.5–11.7	2.8–3.2	4.2–4.5	11.4–13.6	3.4–4
Homestead, Florida, *paratype*		12	3.1	4.3	13.5	4.3
Lakeland, Florida		12.9	3.4	4.7	13.7	4.4

[67] This process can not be seen in any of the specimens before us, without removing either the supra-anal or subgenital plate.

♀		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Ojus, Florida....	(5)	10.8–12.2	3.3–3.7	4.4–4.8	10.4–11.3	3.6–3.8
Miami, Florida, *allotype*.....		11.3	3.2	4.5	11.2	3.7
Miami, Florida, *paratypes*.....	(5)	10.9–11.8	3.2–3.5	4.4–4.6	10.3–11.5	3.6–4
Homestead, Florida, *paratype*...		11	3.1	4.5	11.7	3.9

Coloration.—Glossy; warm buff in general coloration. Head warm buff with flattened inter-ocular-ocellar area prout's brown, this broken mesad by twin spots of warm buff; several flecks of prout's brown on face below this marking. Eyes deep mummy brown. Antennae snuff brown, paler proximad. Maxillary palpi sepia, with proximal joints somewhat paler. Pronotum with disk warm buff, supplied with a few[58] very small dots of prout's brown, lateral areas transparent and almost colorless. Tegmina transparent warm buff, with marginal field almost colorless. Wings hyaline, faintly tinged with buffy in area of costal veins, principal veins translucent, dark buffy brown. Dorsal surface of abdomen warm buff, suffused on either side with mummy brown, ventral surface of general coloration, suffused on either side with a moderately broad band of dark mummy brown, which is more decided in the male, the remaining narrow lateral borders pale buffy, both dorsad and ventrad. Cerci prout's brown.

Immature examples are antimony yellow to ochraceous-buff in general coloration, with the darker markings as in the adults more tawny, while the submarginal dark suffusions of the dorsal surface of the abdomen are continued on the metanotum, and frequently this color appears strongly on the mesonotum meso-laterad, immediately within the tegminal projections. In the intensive condition, the dark brown marking is there triangular on each side. This type of coloration prevents confusion of immatures of this species with those of any other Floridian form.

The insect was found very widely distributed throughout the pine woods (*Pinus caribaea*) in extreme southeastern Florida.

[58] In specimens of intensive coloration this area is distinctly speckled, while the inter-ocular dark area is almost solid.

Though its probable natural daytime habitat is under the bark of these trees, the series was taken almost exclusively under signs on the trunks, sometimes as many as eight or ten examples being under one sign. The insects when disturbed were active, but seldom attempted flight, running about on the trunk to hide in cracks of the bark or dropping to the ground. With them were frequent colonies of *Eurycotis floridana*, more rarely of *Periplaneta australasiae*, while in one case a specimen of *Parcoblatta fulvescens* was noted to be not only more active in its movements, but quick to seek safety in flight.

The material recorded below represents all that has been secured of the present species.

Specimens Examined: 86; 45 males, 23 females, 18 immature individuals.

Newberry, Florida, XI, 19, 1911, (W. T. Davis), 1 juv. ♂, [A. N. S. P.].

Lakeland, Fla., (G. G. Ainslie), 1 ♂, [Fox Cln.]; III, 28, 1912, (W. T. Davis), 1 juv. ♂; V, 5, 1912, (W. T. Davis), 1 ♂, [Davis Cln. and A. N. S. P.].

Fort Myers, Fla., IV, 2, 1912, (W. T. Davis), 1 juv. ♂, [Davis Cln.].

Punta Gorda, Fla., XI, 14, 1911, (G. P. Englehardt), 1 small juv., [A. M. N. H.].

Everglade, Fla., IV, 9, 1912, (W. T. Davis), 1 ♂ [Davis Cln.].

Marco, Fla., IV, 18, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Chuluota, Fla., X, 2, 1902, (H. S. Barber), 1 small juv., [U. S. N. M.].

Deerfield, Fla., III, 1, 1916, (Hebard; under sign on *Pinus clausa*), 1 juv. ♂, [Hebard Cln.].

Fort Lauderdale, Fla., III, 1, 1916, (Hebard; under signs on *Pinus caribaea*, 1 bred adult III, 16), 4 ♂, 3 ♀, *paratypes*, [Hebard Cln.].

Ojus, Florida, II, 29, 1916, (Hebard; under signs on *Pinus caribaea*, 9 bred adult III, 6 to V, 9), 5 ♂, 5 ♀, *paratypes*, [Hebard Cln.].

Miami, Fla., (Mrs. A. T. Slosson), 1 ♂, *paratype*, [M. C. Z.]; II, 1, 1904, (Hebard), 1 juv. ♀, [Hebard Cln.]; II, 6, 1913, (Hebard; hotel porch, attracted to light on previous night), 1 ♂, *paratype*, [A. N. S. P.]; II, 7, 1904, (Hebard; under sign on *Pinus caribaea* on edge of town), 1 ♂, 2 ♀, *type*, *allotype*, *paratype*, [Hebard Cln. and A. N. S. P.]; II, 28, 1916, (Hebard; under signs on *Pinus caribaea*, portion bred adult II, 29 to IV, 7), 13 ♂, 4 ♀, *paratypes*, 3 juv. ♂, 4 juv. ♀, [Hebard Cln. and A. N. S. P.].

Cocoanut Grove, Fla., III, 3, 1917, (Hebard; under signs on *Pinus caribaea*, portion bred adult III, 3 to 12), 11 ♂, 8 ♀, *paratypes*, 3 juv., [Hebard Cln. and A. N. S. P.].

Homestead, Fla., III, 18, 1910, (Hebard; under bark of pine log, *Pinus caribaea*), 1 ♂, *paratype*; VII, 11, 1912, (Rehn and Hebard; dead in spider web on railroad station, probably attracted to light at night), 1 ♀, *paratype*, [both Hebard Cln.].

Dade County, Fla., (E. A. Schwarz), 4 ♂, [U. S. N. M.].

Big Pine Key, Fla., IX, 19, 1913, (W. T. Davis), 1 juv. ♂, [Davis Cln.].

Latiblattella lucifrons new species (Plate I, figures 18 to 23.)

1907. *Blattella dilatata* Rehn, (not *Blatta dilatata* Saussure, 1868), Proc. Acad. Nat. Sci. Phila., 1907, p. 26. [♂, ♀, Palmerlee and Huachuca Mountains, Arizona.]

1910. *Blattella dilatata* Rehn, (not *Blatta dilatata* Saussure, 1868), Kansas Univ. Sci. Bull., xv, p. 300. [♂, ♀, Santa Rita Mountains, Arizona, 5000 to 8000 feet.]

At the time the above determinations[59] were made, Saussure's *dilatata* was known only from the female type from Orizaba, Mexico, with the description of which, females of the present species agreed better than with those of any other known species. Though we unfortunately have no topotypic material of that species, we have a pair from San José del Cabo, Lower California, and a male from Sierra El Tosti, Lower California, the latter taken in October, 1893, by Gustav Eisen. These specimens are apparently typical of *dilatata*. When compared with the present species, the males are found to be in general quite similar, but with very distinctive genital characters, of which one of the most striking is the production of the latero-caudal angles of the sixth dorsal abdominal segment and the decided constriction of the seventh and eighth. The female is, in general, quite similar to that sex of the present species, but has the tegmina and wings less reduced, extending, as in the type of *dilatata*, slightly beyond the apex of the abdomen.

The present species shows nearest relationship to *L. rehni*, males of this insect bear to males of that species a close resemblance; they are separable by genital features, by the wider interocular space, strikingly paler vertex and normally decidedly heavier ventro-lateral brown bands. In both sexes the head has the interocular-ocellar area more flattened, with eyes less decidedly projecting laterad, than in *rehni*. The females of the two species are very different; in *rehni* this sex does not differ widely from the male, while in the present species the sexes are very dissimilar, the female having the pronotum much broader with caudal margin nearly straight, while the disk of the pronotum is much more embrowned, as is the dorsum of the abdomen, which is but partly concealed by the considerably more abbreviate tegmina and wings.

[59] All of the material upon which these were based is now before us and is listed below.

Type.— ♂; Santa Rita Mountains, Arizona. Elevation 5000 to 8000 feet. July. (F. H. Snow.) [University of Kansas Collection.]

Description of Type.—Size medium, form moderately broad. Head with interocular space fully three-quarters that between antennal sockets; inter-ocular-ocellar area distinctly flattened; ocellar spots moderately distinct; very small circular areas with surfaces very feebly convex are apparent meso-ventrad and adjacent to antennal sockets. Maxillary palpi with distal joint large, in length not quite equal to penultimate joint, which is shorter than third joint in relatively greater ratio. Pronotum as in *rehni*. Tegmina and wings much as in that species, the wings, however, with veins slightly paler. Abdomen with proximal dorsal segments unspecialized; sixth with a semicircular depression mesad, even deeper and more sharply defined than in *rehni*, fringe of hairs cephalad similar, but with hairs on dorso-cephalic face of knob decidedly shorter, agglutinated and parting from a medio-longitudinal line, caudad of the knob the segment is subchitinous as in *rehni*, but with margin convex, feebly produced, showing very slight emarginations at the latero-caudal bases of the knob, latero-caudal margins of this segment weakly subrectangulate produced with apex bluntly rounded; succeeding segments decidedly constricted, decidedly narrower in transverse section, brief exposed portions of seventh and eighth segments very delicate in structure. Supra-anal plate transverse, weakly triangularly produced with apex weakly bilobate. Ventro-mesad, within the anal chamber, a soft integument projects from base of subgenital plate, with filaments converging distad and terminating in an acute-angulate projection with apex rounded, soft, except narrowly along its dextral margin where it is chitinous, the lateral margin of this chitinous section being thickly supplied with minute, microscopic, chitinous spines, directed cephalo-laterad. Above this integument, a similar but more slender, soft integument extends farther caudad, above from this mantle springs an elongate, spiral, chitinous thorn, longer than the analogous thorn in *rehni*, directed caudad. Subgenital plate not large, somewhat asymmetrical; the disto-mesal section of this plate is produced, directed upward, its margin roughly rotundato-angulate on each side and slightly more produced sinistrad; the mesal portion of the plate is deeply cleft on each side toward its mesal section, the lateral sections thus formed being produced mesad over the mesal section in two slender, flattened projections (the styles), while within from the base of the sinistral process a more strongly chitinous, cylindrical process is directed perpendicularly dorsad, with enlarged apex flattening out caudad with margins rounded, its flattened dorsal surface on a level with the slender projecting apices of the lateral processes. Limbs and armament of same as given in generic description.

Allotype.— ♀; same data as type. [University of Kansas Collection.]

Description of Allotype.—Agrees with male except in the following features. Form much broader. Head with interocular space wider, fully four-fifths as wide as

space between antennal sockets. Pronotum very decidedly broader, with caudal angles much more sharply rounded. Tegmina and wings decidedly reduced, falling slightly short of apex of abdomen, the tegmina more corneous in structure with discoidal sectors fewer (6 often, due to the decided reduction). Dorsal surface of abdomen not specialized. Supra-anal plate broad, triangular in general outline, with apex blunted (in other specimens slightly emarginate), lateral margins weakly concave (in other specimens to varying degrees). Subgenital plate of same type as in *rehni*, but with lateral portions not as much raised, emargination where cerci project less decided and meso-distal cleft shorter.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Santa Rita Mountains, Arizona, *type*		12.3	3.3	4.8	13.7	4.2
Santa Rita Mountains, Arizona, *paratypes*	(3)	11.9–13.4	3.3–3.4	4.6–4.8	13.9–14.6	4.1–4.2
Huachuca Mountains, Arizona		12.1	3.2	4.6	13.7	4.3
♀						
Santa Rita Mountains, Arizona, *allotype*		12.5	3.8	5.5	8.7	3.7
Huachuca Mountains, Arizona	(3)	12.2–13.7	3.7–4	5.3–5.6	8.6–9	3.4–3.8

Coloration.— ♂. Glossy; warm buff in general coloration. Head with vertex strikingly pale buff, ocellar spots of same color, the remaining portions of face maculate with prout's brown. Eyes deep mummy brown. Antennae proximad warm buff, darker beyond specialized joints. Maxillary palpi warm buff somewhat suffused with brown. Pronotum as in *rehni*. Tegmina and wings much as in that species, the latter with veins paler. Dorsal surface of abdomen warm buff, but very broadly suffused on each side with mummy brown, leaving only narrow lateral margins and a mesal line of the paler coloration; ventral surface warm buff suffused on either side with a heavy band of dark mummy brown, the remaining brief lateral borders of these segments narrowly whitish. Cerci prout's brown.

♀. Similar to male, but generally the browns are more tawny. This particularly noticeable on disk of pronotum, which is mottled ochraceous-buff and ochraceous-tawny, with specks of cinnamon.

Tegmina transparent buckthorn brown. Dorsal surface of abdomen more heavily suffused, mesal line absent in darker specimens. General coloration of ventral surface of abdomen, russet.

Ootheca.—The only ootheca before us is very slightly extruded. We can, however, say that the surface is smooth, the caudal margin perpendicular, feebly convex throughout, the width 3.1 millimeters. It is carried with suture dorsad.

The material recorded below is all that is known of this interesting species.

Specimens Examined: 12; 7 males and 5 females.

Huachuca Mountains, Arizona, (C. Schaeffer), 1 ♂, 4 ♀, [B. I., U. S. N. M. and Hebard Cln.].

Garces, Huachuca Mountains, Ariz., 1 ♂, [U. S. N. M.].

Santa Rita Mountains, Ariz., over 5000 feet, VI, VII, (F. H. Snow), 4 ♂, 1 ♀ with ootheca, *type, allotype, paratypes*, [Univ. Kansas, Hebard Cln. and A. N. S. P.].

Kit's Peak Rincon, Baboquivari Mountains, Ariz., 4000 feet, VIII, 1, 1916, (Rehn and Lutz; at light), 1 ♂, [A. M. N. H.].

SUPELLA Shelford

1911. *Supella* Shelford, Ent. Monthly Mag., ser. 2, xxii, p. 155.

Of the genera here considered, nearer relationship is found to *Latiblattella*, the present genus differing widely in the conspicuous rounded angulation formed at the juncture of the interocellar space and the ocellar areas, the extremely slender limbs, with cephalic femora showing type A armament of the ventro-cephalic margins and the strongly oblique discoidal sectors of the tegmina.

The genus is known from a single species.

GENOTYPE: *Supella supellectilium* [*Blatta supellectilium*] (Serville).

Generic Description.—Sexes decidedly different in form. Head with eyes well separated; inter-ocular-ocellar area decidedly flattened, raised so that ocellar areas are very sharply defined with rounded angle there formed conspicuous. Tegmina in fully developed condition (only in male) delicate, not broad; discoidal sectors numerous (usually 9 to 11), strongly oblique. Tegmina decidedly reduced in female. Wings hyaline, faintly iridescent; costal veins feebly clubbed distad, intercalated triangle small but evident. Abdomen of male with sixth dorsal segment specialized

and succeeding segments transversely constricted. Subgenital plate of male fusing and specialized with styles. Subgenital plate of female not strongly produced. Limbs extremely slender. Cephalic femora with ventro-cephalic margin armed with a row of moderately long and rather stout spines, which gradually decrease in length, with distal series short, terminated by two distal spines elongate in increasing ratio. Ventro-caudal margin of cephalic femora unarmed, ventral margins of other femora armed with occasional, irregularly placed, elongate spines. First three tarsal joints very elongate, with minute distal pulvilli, fourth joint subquadrate with distal half of brief ventral surface occupied by a pulvillus. Small arolia present.

Supella supellectilium (Serville) (Plate I, figures 24 to 27.)

1839. *Blatta supellectilium* Serville, Hist. Nat. Ins., Orth., p. 114. [♂, ♀; Mauritius.]

Shelford has established the following synonymy for the present species; *Blatta cubensis, capensis* and *phalerata* of Saussure; *Blatta incisa, extenuata, subfasciata, transversalis, figurata* and *Ischnoptera quadriplaga* of Walker, and *Phyllodromia delta* of Kirby.

The striking color variation, due entirely to decided intensification and recession, has in part been the cause of the synonymy given above. Though in certain regions distinct types would at first glance seem to exist, further examination shows that such distinction would be untenable, individuals in large series from the same locality always showing an extremely wide range in intensive and recessive coloration.[60] The dissimilarity of the sexes is striking.

Characters of Male.—(Key West, Florida.) Size medium small, form extremely slender. Head elongate; interocular space distinctly narrower than the broad eyes; very small ocellar areas ample and perpendicular to flattened inter-ocular-ocellar area; slightly raised, circular areas present meso-ventrad of, and adjacent to, antennal sockets; face, below transverse ventral margin of inter-ocular-ocellar

[60] Egyptian and South African material before us shows the great variability in the degree of coloration in the present species. The Egyptian examples are very pale, with darker markings weakly defined. The South African specimens are brilliantly colored, with dark markings sharply defined and often with a pale mesal spot on the pronotum; these further show a greater size development than in any other series before us. Nothing warranting geographic racial distinction is to be found.

area, deplanate for a short distance, then transversely convex, with lateral margins converging ventrad. Maxillary palpi extremely elongate and slender. Pronotum transversely very weakly raised; lateral portions narrow, rather opaque and moderately deflexed, with immediate margins upcurved; caudad, above the insertion of the tegmina, the pronotum, to its disk, is distinctly convex; caudal margin transverse (varying from very weakly convex to very weakly concave). Channels between discoidal sectors of tegmina as pronounced as the veins. Dorsal surface of abdomen unspecialized to fifth segment, there showing a slightly raised and rounded convex ridge mesad at its caudal margin, this ridge forms the cephalic portion of the periphery of a circular, deeply depressed area, mesad on the sixth segment, which is bounded by a slightly raised and rounded ridge and has its floor heavily clothed with agglutinated hairs directed meso-cephalad, thus forming a low, subconical tuft, latero-caudal angles of segment not produced and broadly rounded; seventh segment decidedly constricted, caudal margin transverse; eighth segment and supra-anal plate even more strongly constricted, with caudal margin of eighth segment broadly convex, thus embracing all but distal portion of supra-anal plate. Supra-anal plate narrowly visible, feebly triangularly produced, with apex weakly emarginate. Dorsad the anal chamber is filled proximad by two, irregularly rounded, chitinous plates, flattened caudad, beneath which projects a soft integument, terminated by a small, somewhat twisted, chitinous plate, with ventral margin convex and acute-angulate dorso-distad. Subgenital plate strongly triangularly produced, the lateral margins with a sudden, shallow offset on each side from which spring rather large, elongate, simple styles, directed along the margin of the plate toward its apex, which is convex and rather deeply and narrowly cleft.

Characters of Female.—(Key West, Florida.) Agrees with the male except in the following features. Form moderately stout. Head distinctly broader; interocular space distinctly wider than eyes; ocellar areas decidedly smaller, rounding more sharply into inter-ocular-ocellar area; ocellar spots smaller and feebly defined. Pronotum in general similar but more ample, with contour more even and areas above insertion of tegmina hardly raised. Tegmina much shorter, extending only to end of abdomen and more chitinous in structure; discoidal sectors (usually 8 or 9 and more crowded, due to tegminal reduction) and intervening channels much less strongly defined. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, weakly triangularly produced, with apex briefly rectangulate emarginate. Subgenital plate large and broad, distal margin truncate and very weakly convex, showing a weak, obtuse-angulate, rounded emargination at point where cerci project.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida	11.3	2.8	3.6	11	3.1
Key West, Florida	11.5	2.9	3.7	11.6	3.3

♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Miami, Florida	12	3.7	4.3	8.2	3.3
Key West, Florida	10	3.4	4.1	8.3	3.3
Key West, Florida	11.8	3.3	4.1	7.8	3.2

Coloration.—♂. Recessive. General coloration ochraceous-buff. Head with occiput to below antennal sockets ochraceous-tawny, face and genae suffused with blackish chestnut brown. Pronotum with disk ochraceous-tawny, remaining portions transparent ochraceous-buff, except latero-caudad, where two blotches of deep chestnut brown occur. Tegmina transparent buckthorn brown, tinged with cinnamon brown proximad, paler distad, sutural margin ochraceous-buff, merging gradually into the darker color, excepting near the apex of the anal field, where a broad band of this paler color crosses the tegmen. Wings hyaline with a faint iridescence, area of costal veins tinged with buffy, this decided mesodistad. Limbs and abdomen unicolorous ochraceous-buff. In the more usual intensive type of coloration the occiput is ochraceous orange, the pronotal disk deep chestnut brown, this color expanding caudad and embracing the entire caudal margin. The tegmina proximad and mesad beyond the pale transverse band are translucent cinnamon brown. Every gradation between these conditions occurs. ♀. Similarly marked but usually of darker coloration than the male. The pale median transverse tegminal band is reduced to a triangular invasion of the more uniformly dark tegmen.

In the immature stages the coloration is similar, but the mesonotum bears two chestnut-brown diffused triangular markings at the caudal margin, immediately within the area occupied by the tegminal pads. The metanotum is uniformly pale. The abdomen is also uniformly pale, except laterad the two proximal dorsal segments are tinged with darker brown, while the entire median segment is dark chestnut brown.

This circumtropical domiciliary species has only become established in the United States in extreme southern Florida. The following series has all been correctly recorded by Rehn and Hebard,

the Miami specimen having previously been recorded by Rehn as the synonymous *Phyllodromia cubensis* (Saussure).

Specimens Examined: 14; 8 males, 5 females and 1 immature individual.

Miami, Florida, (P. Laurent), 1 ♀, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1913, (Rehn and Hebard; under the counters of a fruit store, in folds of old burlap bags, in company with *Blattella germanica, Leurolestes pallidus, Periplaneta americana* and *Holocompsa nitidula*), 8 ♂, 4 ♀, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

CARIBLATTA Hebard

1916. *Cariblatta* Hebard, Trans. Am. Ent. Soc., xlii, p. 148.

The present genus, the majority of the species of which are found in the West Indies and northeastern South America, shows much the nearest relationship to the large tropical American genus *Neoblattella*.[61] At the time of publication, the author had not determined the proper position of *Blattella* in the Group Blattellites and, as Shelford had placed *Neoblattella* after that genus, the same course was followed for the present genus. The genus in linear arrangement should, however, follow *Supella* and come before *Neoblattella*, the latter genus preceding *Blattella*.

GENOTYPE, by original designation: *Cariblatta punctulata* [*Blatta punctulata*] (Beauvois).

Generic Characters.[62]—Size small to very small, form moderately slender to distinctly slender for the group. Sexes showing but little difference in size and form.[63] Head with eyes well separated, inter-ocular-ocellar area weakly defined, weakly flattened; ocellar areas not strongly defined. Pronotum weakly convex, lateral margins convex, caudal margin convex truncate. Tegmina (in normally full developed condition[64]) delicate, not broad; discoidal sectors few (in the majority of species 5, in *insularis* and possibly *punctipennis* often 6), longitudinal. Wings hyaline, weakly to

[61] This genus was compared with *Cariblatta*, Trans. Am. Ent. Soc. xlii, p. 148, footnote 3.

[62] The original description of the genus is much more detailed, only the most important characters being here given.

[63] Though but slight differences in size and form are found in the sexes of *lutea*, the sexes of this species are distinctly more dissimilar than those of any of the other species of the genus.

[64] The only known species of the genus, in which distinct reduction of the organs of flight occurs, is *lutea*.

distinctly iridescent[65]; costal veins strongly and briefly clubbed distad; intercalated triangle small but evident. Dorsal surface of male abdomen not specialized. Subgenital plate of male simple or greatly specialized, symmetrical or asymmetrical; styles of varied distinctive types. Femora slender. Cephalic femora with ventro-cephalic margin supplied proximad with (usually four) long, widely spaced spines, the more distal shortest, succeeded distad by a more closely set row of shorter spines, terminated by two long spines, the more distal the longer; ventro-caudal margin with two, widely spaced, long spines meso-distad and a single long distal spine. Other ventral femoral margins supplied with long spines. First three tarsal joints very elongate, each supplied distad with a minute pulvillus[66] produced in an elongate acute process; fourth tarsal joint subquadrate, with distal half of brief ventral surface occupied by a similar pulvillus. Small arolia present.

The genus is now known to include ten species and one geographic race.

Cariblatta lutea lutea (Saussure and Zehntner) (Plate II, figures 1 and 2.)

1893. *Ceratinoptera lutea* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 48. [♂, ♀ : Georgia, Louisiana.]

The present species divides into two races in the United States. The present race is widely distributed over the southeastern United States, but is replaced by *lutea minima* in southern peninsular Florida and in the Florida Keys. A single exotic specimen, from Baños San Vincente, Pinar del Rio, Cuba, is before us, a female referable to *lutea lutea*.

This insect is much the smallest of the known species of the Blattellites found in the United States. It is ochraceous-buffy in general coloration, with head usually showing a transverse band of bister between the eyes and occasionally below this, one, rarely two, lesser bands of the same color. The pronotum is finely pictured with snuff brown to bister.

In the reduction of tegmina and wings the present species is distinct from the other known forms of the genus, of which near relationship is shown to the genotype, *C. punctulata*. From that

[65] In *Cariblatta imitans* Hebard, alone, the wings show no trace of iridescence.

[66] This condition is also found in *Neoblattella*.

species, as well as from *lutea minima*, the present race may be distinguished, in the male, by having the distal margin of the subgenital plate between the specialized styles broadly and rather weakly produced, the produced portion forming a strongly transverse rectangle. Females of *lutea lutea* can be separated from those of *lutea minima* only by their average larger size and less abbreviate tegmina. These features readily distinguish *lutea lutea* from any other form found over the regions here under consideration; a full description with extensive comparisons has recently been published.[67]

Measurements (in millimeters) of extremes in series[68]

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂	(6)	5.8–8.1	1.8–2.1	2.6–2.8	5.2–6.6	2–2.1
♀	(14)	7–9.5	2.2–2.6	2.8–3.6	4.9–6	2.1–2.6

The extremes given appear to be due almost wholly to individual variation.

The young of this species have the markings of the head and pronotum averaging more intensive than in the adults, with dorsal surface of abdomen dark, maculate with ochraceous-buffy mesad and laterad.[69]

The species is in large part terrestrial, being usually found among dead leaves and litter on the ground. Occasional specimens are, however, sometimes beaten from bushes. Individuals are decidedly active and are usually found in the greatest numbers in sandy situations.

Specimens Examined: 51; 10 males, 31 females and 10 immature individuals.

Roanoke Island, North Carolina, VII, 25, (G. P. Englehardt), 1 ♀, [Bklyn. Inst.].

Raleigh, N. C., VI, 8, 1905, 1 ♀, [A. N. S. P.]; VI, 23, 1904, (C. S. Brimley; under rubbish), 1 ♀, [Hebard Cln.].

[67] Hebard, Trans. Am. Ent. Soc., xlii, pp. 165 to 170, pl. xiii, fig. 3, (1916).

[68] Table given in full, Trans. Am. Ent. Soc., xlii, p. 167.

[69] In the generic study by the author, two very small immature examples of *Parcoblatta* sp. indet. from Southern Pines, North Carolina and Atlantic Beach, Florida, and one immature individual of *Chorisoneura texensis* Saussure and Zehntner from Natchez, Mississippi, were unfortunately recorded as this insect. These incorrect determinations do not affect the known distribution of the race, which distribution is defined by the records given below and the Louisianan and Cuban examples mentioned above. The coloration of the young of *lutea* is distinctive.

Fayetteville, N. C., IX, 9, 1911, (Rehn and Hebard; under dead oak leaves), 1 juv. ♂, [Hebard Cln.].

Southern Pines, N. C., VI, 17 to VII, 22, 1914 and 1915, (A. H. Manee), 1 ♂, 4 ♀, [Davis and Hebard Cln.].

Wrightsville, N. C., IX, 7, 1911, (Rehn and Hebard), 1 juv. ♀, [A. N. S. P.].

Swansea, South Carolina, VIII, 6, 1911, (F. Knab), 1 ♀, [U. S. N. M.].

Thompson's Mills, Georgia, (H. A. Allard), 2 ♂, 1 ♀, 1 juv. ♀, [U. S. N. M.].

Macon, Ga., VII, 31, 1913, (Rehn and Hebard; undergrowth of short-leaf pine and oak woods), 1 ♀, not retained.

Warm Springs, Ga., VIII, 9 and 10, 1913, (Rehn; beaten from undergrowth), 1 ♀, 1 juv. ♀, [Hebard Cln.].

Albany, Ga., VIII, 1, 1913, (Rehn and Hebard; under needles in long-leaf pine woods), 1 ♀, [Hebard Cln.].

Thomasville, Ga., XII, 31, 1902, (Hebard; in dead oak leaves), 3 juv. ♂, [Hebard Cln. and A. N. S. P.].

Spring Creek, Ga., VI, 7 to 23, 1911, (J. C. Bradley), 3 ♂, 5 ♀, [Ga. State Cln., A. N. S. P. and Hebard Cln.].

Isle of Hope, Ga., IX, 3, 1911, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

St. Simon's Island, Ga., IV, 22 to V, 12, 1911, (J. C. Bradley), 2 ♀, [A. N. S. P. and Ga. State Cln.].

Billy's Island, Okeefenokee Swamp, Ga., VI, 1912, (J. C. Bradley), 2 ♀, [Cornell Univ. and Hebard Cln.].

Suwannee Creek, Okeefenokee Swamp, Ga., VIII, 28, 1911, (Rehn and Hebard), 1 ♀, [A. N. S. P.].

Jacksonville, Florida, (T. J. Priddey), 2 ♀, [Hebard Cln.].

St. Augustine, Fla., (C. W. Johnson), 1 ♀, [A. N. S. P.].

Ormond, Fla., III, 12 and 20, 1899, (W. S. Blatchley), 2 ♂, [A. N. S. P. and Hebard Cln.].

La Grange, Fla., IX, 10, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Lakeland, Fla., VI, 8, 1912, XI, 8, 1911, (W. T. Davis), 1 ♂, 2 ♀,[70] [A. N. S. P. and U. S. N. M.].

Carrabelle, Fla., IX, 2 and 3, 1915, (Rehn and Hebard; beaten from heavy scrub in damp spot of sand dune area and from high bush, *Ilex lucida*, fringing inland swampy areas), 2 ♀, [Hebard Cln. and A. N. S. P.].

River Junction, Fla., VIII, 31, 1915, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Springhill, Mobile County, Alabama, VIII, 25, 1915, (Hebard; undergrowth in long-leaf pine woods), 1 ♀, [Hebard Cln.].

Mouth of Mary Walker Bayou, Mississippi, (C. B. Moore), 1 juv. ♂, [A. N. S. P.].

Natchez, Miss., VI, 15, 1909, (E. S. Tucker; at sugar), 1 ♂, [U. S. N. M.].

[70] These specimens show a tendency toward *lutea minima*; the male has the production of the subgenital plate only twice as broad as long.

Cariblatta lutea minima Hebard (Plate II, figures 3 to 5.)

1916. *Cariblatta lutea minima* Hebard, Trans. Am. Ent. Soc., xlii, p. 170, pl. XIII, fig. 4. [♂, ♀; localities listed in present paper.]

This geographic race is confined to southern peninsular Florida and the Florida Keys. It may be separated from typical *lutea* by the average smaller size; average paler and more yellowish buff, rather than distinctly cinnamon, tones of general coloration; more decided tegminal reduction, particularly in the male sex, in which these organs show fully as much reduction as in the female; apparently always vestigial wings, and by the narrower median production of the male subgenital plate.

Type.— ♂; Miami, Florida. March 3, 1915. (M. Hebard.) [Hebard Collection, Type no. 418.]

Description of Male.—Type. Size very small, form slightly more robust than is normal in typical *lutea*. Pronotum with point of greatest width at the latero-caudal angles, caudal margin nearly straight, more truncate than in this sex of *lutea*.[71] Tegmina decidedly reduced, reaching only to base of seventh dorsal abdominal segment; with three longitudinal discoidal sectors (thus the median vein branches but once) and no cross-veinlets. Wings vestigial. Supra-anal plate as in typical *lutea*. Subgenital plate as in that race, but with specialized styles slightly closer to each other and production of intervening portion of distal margin very small, subquadrate, very slightly longer than wide.

Allotype.— ♀; Miami, Florida. March 14, 1916. (M. Hebard.) [Hebard Collection.]

Description of Female.—Allotype. Similar to male, but larger and distinctly more robust. Pronotum slightly broader, caudal margin straight, truncate. Tegmina and wings much as in male, except that dextral tegmen has four discoidal sectors. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin showing a small, short, median concavity. Subgenital plate as in typical *lutea*.

Measurements (in millimeters) of extremes in series

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂	(29)	5.4–7.7	1.8–2.1	2.6–3.1	3.6–5	1.7–2
♀	(53)	5.8–8	2–2.3	2.7–3.3	3.6–4.7	1.8–2.2

[71] As we have found elsewhere in the Blattidae, tegminal reduction appears to be accompanied by a broadening of the pronotum, with a lessening of the convexity of the caudal margin and a coincident shifting caudad of the point of greatest pronotal width. The pronotal features given above show rather this adjustment than what might appear, to the casual observer, to be features separating the present race from *lutea lutea* and the species widely from the other members of the genus.

The flattening of the caudal margin of the pronotum is more pronounced in this race, which shows normally greater tegminal and wing reduction than does typical *lutea*.

The young of this race are inseparable from those of *lutea lutea*. The habits of the insect agree fully with those of the more northern race; but, when present, we have found *lutea minima* decidedly the more numerous.

The single ootheca before us is 1.8 mm. in depth. The dorsal and ventral margins are parallel and very slightly curved, the dorsal (suture) being supplied with widely spaced, minute knobs[72]; the divisions of the egg sacks are distinctly indicated on the weakly roughened, moderately convex sides, by widely spaced vertical ines. The single example before us bearing an ootheca, is carrying this egg case with suture laterad.[73]

Specimens Examined: 120; 44 males, 66 females, 10 immature individuals.

Punta Gorda, Florida, XI, 14 to 16, 1911, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.]; (Mrs. A. T. Slosson), 1 ♀ with ootheca, [Hebard Cln.].

Fort Myers, Fla., III, 29 to V, 20, 1912, (W. T. Davis), 2 ♂, 2 ♀, [Davis Cln.].

Citrus Center, Fla., V, 2, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

South Bay, Lake Okeechobee, Fla., IV, 30 to V, 2, 1912, (W. T. Davis), 11 ♂, 24 ♀, 1 juv. ♀, [Davis and Hebard Clns.].

Marco, Fla., IV, 19, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

Everglade, Fla., IV, 5 to 13, 1912, (W. T. Davis), 10 ♂, 23 ♀, [Davis Cln., A. N. S. P. and Hebard Cln.].

Chokoloskee, Fla., IV, 8, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

Miami, Fla., III, 4, 1916, (Hebard; Musa Isle, under dead petioles of cocoanut palm on sandy soil in grapefruit grove), 8 ♂, 5 ♀, *paratypes, allotype*, 2 juv. ♂; III, 8, 1915, (Hebard; Brickell's Hammock, on ground under luxuriant undergrowth in opening of forest), 1 ♂, *type*, [Hebard Cln.]; III, 20, 1910, (Hebard), 1 ♂, *paratype*, 1 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

Virginia Key, Fla., III, 11, 1915, (Hebard; under dark, water-soaked leaves in heavy red mangrove (*Rhizophora mangle*) swamp), 1 juv. ♂, [Hebard Cln.].

Homestead, Fla., III, 17 to 19, 1910, (Hebard), 1 ♂, *paratype;* VII, 10, 1912, (Hebard; under board in everglades), 1 ♂, *paratype*, [both Hebard Cln.].

Key Largo, Fla., III, 18, 1910, (Hebard), 1 ♀, *paratype*, [Hebard Cln.].

Long Key, Fla., III, 13 and 17, 1910, (Hebard; under dead petioles of cocoanut palm on moist ground), 4 ♂, 3 ♀, *paratypes*, 2 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

[72] In *C. punctulata* these projections are bluntly triangular and not widely spaced.

[73] In a specimen of *C. punctulata* before us, the ootheca is carried with suture dorsad. It is known to be carried in both vertical and horizontal position in *Parcoblatta pensylvanica*.

Key West, Fla., I, 20, 1904, (Hebard), 1 ♂; III, 15 to 16, 1910, (Hebard; under boards, short grass in open), 1 ♂, 4 ♀, 1 juv. ♀; VII, 7, 1912, (Rehn and Hebard; leaf mould in jungle key scrub), 1 ♂, [all Hebard Cln. and A. N. S. P.].

BLATTELLA Caudell

1839. *Phyllodromia* Serville, Hist. Nat. Ins., Orth., p. 105.
1903. *Blattella* Caudell, Proc. Ent. Soc. Wash., v, p. 234. (New name given for preoccupied *Phyllodromia*.[74])
1911. *Blattella* Shelford, Ent. Monthly Mag., 2d ser., xxii, p. 154. (Genus restricted.)

Though numerous Asiatic and African species belong to the genus as restricted by Shelford, the cosmopolitan genotype alone occurs in America.[75]

GENOTYPE: *Blattella germanica* [*Blatta germanica*] (Linnaeus), designated by Caudell in 1903.[76]

Generic Description.—Sexes only slightly different in form. Head with eyes well separated, area between eyes and antennal sockets not flattened, ocellar areas weakly defined. Tegmina (in fully developed condition, found in the large majority of species) delicate, narrow; discoidal sectors not numerous (usually about 6), longitudinal. Wings hyaline, not iridescent; area of costal veins narrow, costal veins feebly clubbed distad, ulnar vein with minimum branches for group (in genotype normally showing but one fork, occasionally simple or bi-ramose), intercalated triangle small. Abdomen of males with sixth dorsal segment specialized and with succeeding segments specialized in outline. Supra-anal and subgenital plates of male variously produced. Subgenital plate of female convex, truncate. Limbs moderately slender. Cephalic femora with ventro-cephalic margin supplied with a few moderately elongate, heavy spines, grading evenly distad into a series of more frequent, shorter, moderately heavy spines, terminated by three longer spines in increasing length ratio distad; other femoral margins with a few elongate, moderately stout spines. Tarsal joints elongate, first three each with a very small, rounded

[74] Preoccupied by *Phyllodromia* of Zetterstedt (Diptera), described in 1837.

[75] At the present time we can not determine the number of species properly referable to this genus. Numerous species certainly belong here, which are referred to in the literature as "*Phyllodromia*" and one, at least, as "*Ceratinoptera*."

[76] Proc. Ent. Soc. Wash., v, p. 234.

pulvillus distad, fourth joint with distal half supplied with a small pulvillus. No large arolia present.

Blattella germanica (Linnaeus) (Plate II, figures 6 to 9.)

1767. [*Blatta*] *germanica* Linnaeus, Syst. Nat., ed. xii, i, p. 668. [Denmark.]

The established synonyms of this species are *Blatta obliquata* Daldorff and *Ischnoptera bivittata* Thomas.

The pale coloration, with two, dark, parallel, longitudinal bands on the pronotum, and small size of the present insect serve readily to distinguish it from any of the other species here considered. Many of the exotic species of the present genus agree closely with *germanica* in general appearance, but are easily separated by very striking primary and secondary male genital features.

Characters of Male. (Miami, Florida.) Head elongate, more evenly rounded in contour, with eyes not as much projecting as in the majority of the species of the Blattellites; interocular space three-quarters as wide as space between antennal sockets; ocellar spots distinct; face very weakly flattened mesad below ocelli, lateral margins below eyes weakly convergent ventrad. Maxillary palpi short for group, third and fifth joints subequal in length, fourth joint slightly shorter than either. Pronotum transversely weakly convex; lateral portions not broad, moderately deflexed and very weakly opaque; caudal margin very feebly and bluntly obtuse-angulate produced. Tegmina elongate. Dorsal surface of abdomen unmodified to sixth segment, with latero-caudal angles of segments weakly produced and broadly rounded; sixth segment with latero-caudal angles more produced and caudal margin deeply brace-shaped emarginate, the broad meso-proximal area occupied by two, deep, rounded, transverse fossae, separated by a narrow, high, medio-longitudinal ridge, with caudal margins of fossae raised laterad in low, rounded ridges; meso-caudal area deeply concave, particularly cephalad, but in a less broadly transverse area; seventh segment as much produced, bilobate, with surfaces weakly convex except proximo-mesad, where twin, small, but very deep, fossae occur; eighth segment no more produced than fifth, transversely distinctly constricted, latero-caudal angles weakly acute-angulate produced, caudal margin weakly and evenly concave. Supra-anal plate strongly produced, subchitinous, with length distinctly greater than proximal width and free margin feebly and evenly convex to the parabolic apex. Sinistrad, within the anal chamber, are situated roundly angulate, chitinous processes, from which, mesad, projects a small, chitinous, flattened plate, tapering to aciculate apex which is directed dorsad. Dextrad, within the anal chamber, from a ventral, soft mantle, projects caudad an elongate, straight, chitinous, aciculate process with surface obliquely furrowed dorsad and externo-laterad; dextrad of this, an elongate, stout, straight, subchitinous process, with apex rounded, projects caudad. Above these processes, from a

moderately large chitinous lobe with surface moderately convex, a chitinous, aciculate process is directed ventro-mesad. Subgenital plate strongly asymmetrical, subdeplanate, except laterad, where the lateral portions are rather narrowly reflexed; sinistral margin briefly lobate proximad, due to an acute-angulate emargination immediately dextrad of sinistral cercus, the margin decidedly thickened, straight and rather strongly oblique from base of this emargination to near mesal point of the plate; there supplied with a very small, rounded, decurved style, the dorsal surface of which is supplied with scant, chitinous, microscopic spines; close to this style on the distal margin is situated the dextral style, which is very minute, not half as large; remaining portion of free margin of plate gently convex. Limbs and armament of same as given in generic description.

Characters of Female.—(Key West, Florida.) Agrees with male except in the following features. Size appreciably larger, form less slender. Interocular space slightly wider. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, moderately triangularly produced, with apex blunt, lateral margins weakly concave. Subgenital plate large, not produced, surface decidedly convex, distal margin subsinuous, nearly transverse.

Measurements (*in millimeters*) *of extremes of series*

	Number of specimens[77]	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂	(28)	10.5–11.4	2.4–2.8	3.1–3.7	9.7–10.2	2.7–3.1
♀	(36)	11–12.8	3–3.3	3.8–4.2	10.8–11.9	3.2–3.3

Coloration.—General coloration ochraceous-buff to ochraceous-tawny. Head, from interocular space to inter-ocellar space, heavily washed with mars brown. Pronotum with paired, moderately heavy, longitudinal lines of deep mars brown, leaving a slightly broader longitudinal band mesad, which is sometimes washed with tawny. Rarely these bands are more decided (intensive), or very feebly indicated (recessive).

Immature examples of the species have the pronotal bands normally broader and continued on the mesonotum and metanotum, while the abdomen is heavily suffused with the darker coloration.

Ootheca.—In proportion to the size of the insect this is extremely large, 7 by 3.2 and 8 by 3.3 mm. in specimens before us; carried with suture laterad. Sutural and ventral margins weakly arcuate, width everywhere equal; distal margins straight, vertical. Sur-

[77] The body bulk shows more contrast between the sexes than this measurement would indicate, due to the fact that, in the male, the subgenital plate is strongly produced, while in the female it is decidedly truncate.

face polished, shining, with vertical divisions of egg-sacs distinct. Suture very low, formed with short divisions, which from the side are seen to be convex, from above these are found to constitute narrow convex ridges on each side, nearly joining mesad, where each pair is connected with the next by a very brief, medio-longitudinal ridge.

This cosmopolitan species has established itself widely in human habitations almost everywhere in the United States. In Canada it has been recorded as far north as De Grassi Point on Lake Simcoe, Ontario; Goderich, Ontario; Winnipeg, Manitoba, and Strathcona, Alberta. Its greatest abundance on this continent appears to be reached in the central portion of the United States. According to Burr, it is known in Prussia as the Russian Roach, in Russia as the Prussian Roach. In New York it is usually called the Croton Bug.

Specimens Examined: 72; 32 males, 39 females and 1 immature individual.

Philadelphia, Pennsylvania, I, 27, 1916, (H. Winchester), 1 small juv., [Hebard Cln.]; 4 ♀, 1 with ootheca, [A. N. S. P.].

Harrisburg, Pa., VII, 7, 6 ♂, 4 ♀, [Pa. State Dept. Zool, Cln.].

Chestertown, Maryland, VIII, 12, 1903, (E. G. Vanatta), 1 ♂, 2 ♀, [A. N. S. P.].

Washington, District of Columbia, VIII, 1883, 1 ♀ with ootheca, [Hebard Cln.].

Hot Springs, Virginia, 2350 feet, VIII, 3, 1916, (Hebard; in larder, seen common in house at night), 1 ♀, [Hebard Cln.].

Raleigh, North Carolina, VI, 10 to IX, 13, 1904 and 1905, (Brimley and Bentley), 2 ♂, 2 ♀, [N. C. State Dept. Agr. Cln.].

Thomasville, Georgia, III, 24 to V, 11, 1903, (Hebard and for Hebard), 1 ♂, 1 ♀ with ootheca, [Hebard Cln.].

Miami, Florida, IX, 12, 1903, (for Hebard), 3 ♂, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1912, (Rehn and Hebard; swarming in hotel cupboard), 4 ♀, [Hebard Cln. and A. N. S. P.].

Chattanooga. Tennessee, VI, 10, (G. G. Ainslie), 1 ♀, [U. S. N. M.].

Madison, Wisconsin, IV, 22 to X, 14, 4 ♂, 3 ♀, [Wisc. Agr. Exp. Sta. Cln.]

St. Anthony Park, Minnesota, 1 ♀, [Hebard Cln.].

St. Louis, Missouri, X, 25, 1903, (C. L. Heink), 7 ♂, 3 ♀, [Hebard Cln.].

Mineola, Texas, VI, 27, 1911, (H. Pinkus), 1 ♂, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 1 ♂, 4 ♀, 1 with ootheca, [Hebard Cln.].

Fort Wingate, New Mexico, IX, 16, 1909, (J. Woodgate), 1 ♀, [Hebard Cln.].

Deming, N. M., VII, 20, 1907, (Rehn and Hebard; at light), 1 ♂, [Hebard Cln.].

Oregon, (Washburn), 1 ♂, 1 ♀, [Hebard Cln.].

Blue Cañon, Placer County, California, 4700 feet, VIII, 29, 1910, (Hebard), 1 ♂, [Hebard Cln.].

Eldridge, Cal., XI, 8 and 9, 1915, (J. A. Kusche), 3 ♂, 6 ♀, [Hebard Cln.].

The Group Ischnopterites

The majority of the species of this group are less delicate in structure than those of the Blattellites. The tegmina have their discoidal sectors weakly radiating or simply longitudinal, not longitudinal and in part springing at a sharp angle from the ulnar vein near the apex of the anal field, or oblique to the discoidal vein. The wings have the ulnar vein with proximal rami incomplete and distal rami complete, reaching the distal margin. In the forms showing greatly atrophied tegmina and vestigial wings, or wholly lacking wings, such venational features have disappeared, and, in associating these with their proper group, the general facies and less distinctive or constant characters are the only recourse.

This is the second of the very large groups of the Pseudomopinae. Though the first of these, the Blattellites, is of even much greater size and has already been divided into far more genera, these two groups are similar in comprehending an unusual number of yet undescribed genera, in large part of tropical distribution, which include a multitude of species.

None of the numerous species assigned to *Ischnoptera* and found in Africa, Asia, Australia and Polynesia, probably belong to this genus in its restricted sense. Until large series are carefully studied, however, attempts to describe new genera for these, would only lead to such difficulties as were caused in the Blattellites by Shelford's hasty designation and description of a number of then similarly lumped, but evident, generic units.[78] This is likewise true of certain South American groups, which are represented by species which have been referred to *Ischnoptera*, but are distinct from that genus as correctly delimited.

The genera here considered which belong to the present group we list below in their proper sequence. All have been correctly referred to the subfamily Pseudomopinae.

		Genotype	Habitat of genotype
1838.	*Ischnoptera* Burmeister	*morio* Burmeister	Northern South America
1917.	*Parcoblatta* new name	*pensylvanica* (De Geer)	Eastern United States
1916.	*Symploce* Hebard	*capitata* (Saussure)	Cuba
1916.	*Xestoblatta* Hebard	*carrikeri* Hebard	Colombia

[78] See page 25.

ISCHNOPTERA Burmeister

1838. *Ischnoptera* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 500.

The genus was based on four species, three at that time described, the fourth doubtfully included.

We have restricted the genus to the forms showing the features given below, which we are able to ascertain from a specimen of the type species before us; other species, which have been generally referred to *Ischnoptera*, but which do not agree in various characters here given, are properly referable to other distinct, though closely related genera.

GENOTYPE: *I[schnoptera] morio* Burmeister, selected by Kirby in 1904.[79]

Generic Description.—Head elongate; ocelli distinct, with flat surfaces of ocellar areas forming a rather sharp angle with the interocellar space.[80] Pronotum weakly convex, becoming strongly so narrowly laterad; disk in males with two distinct sulcations mesad which converge caudad, in females showing reduction in organs of flight these sulci are usually obsolete; lateral margins of pronotum fully as chitinous as the disk; caudal margin of pronotum very weakly and broadly convex.[81] Tegmina with discoidal sectors (these including the median and ulnar veins and their branches, of which the branches of the ulnar vein are the more numerous) weakly radiating so that the branches near the sutural margin are weakly oblique to that margin (Pl. II, fig. 10). Wings with area between discoidal vein and anterior margin narrow throughout; mediastine vein extending more than half the distance to the apex of the wing, from which spring a number of the costal veins; none of the costal veins enlarged distad; discoidal vein percurrent to apex of wing, undivided, with a number of distinct, well spaced, nearly perpendicular veinlets connecting with

[79] Synon. Cat. Orth., i, p. 80.

[80] In females showing greatly reduced tegmina, the head shows decidedly less specialization, and, as a result, the ocellar areas are very weakly defined and the ocelli represented by pale spots. This condition is not peculiar to the genus; throughout the Blattidae it is found coincident with very decided reduction in the organs of flight and an accompanying greater truncation of the caudal margin of the pronotum.

[81] The caudal margin of the pronotum becomes more truncate and more nearly transverse in material showing decided reduction in the organs of flight. See footnote 80.

the median vein; ulnar vein weakly curved with a number (3 to 7) of proximal incomplete rami and a number (4 to 6) of moderately arcuate distal rami extending to the distal margin of the wing; intercalated triangle small and inconspicuous.[82] Males with median segment not specialized, but with sixth and seventh dorsal abdominal segments greatly specialized. Sixth segment emarginate mesad to near its proximal margin, with sides of emargination convex, bearing beneath on each side near the apex of the emargination a minute chitinous projection, armed dorsodistad with closely set delicate microscopic teeth which are directed cephalad (Pl. II, fig. 12); seventh dorsal abdominal segment in greater part lying under sixth segment, but with a narrow, mediolongitudinal, decidedly elevated ridge lying between the armed projections of the sixth segment. Eighth dorsal abdominal segment unspecialized. Cephalic femora with ventro-cephalic margin armed with (usually about four) heavy, elongate, well separated, proximal spines, succeeded distad by a row of minute, closely set, piliform spines, which is terminated distad by three heavy, elongate (in increasing ratio) spines. Other ventral margins of femora supplied with widely spaced, heavy, elongate spines. Tarsi elongate; a single, small, rounded pulvillus present distad on each of the four proximal tarsal joints. Small arolia present.

The Vilis Group of the Genus *Ischnoptera*

This group includes probably the only native North American[83] species of the genus *Ischnoptera*. It precedes and is separated from the Morio and Rufa Groups by features of the male supra-anal plate, which is of generally similar trapeziform shape but chitinous throughout, while the females of the two species known to us, *vilis* and *deropeltiformis*, both have greatly reduced tegmina. The general coloration in these two species is very dark, the pronotal sulci in the males is pronounced, the male subgenital plate is of the general type found in the Morio and Rufa Groups.

[82] In females of the Morio Group these features are absent, due to great reduction in the organs of flight.

[83] We here use North America in the restricted sense, taking the continent north of the Mexican boundary as covered in the present paper.

Ischnoptera deropeltiformis (Brunner) (Plate II, figs. 10 to 15.)

1865. *T[emnopteryx] deropeltiformis* Brunner, Nouv. Syst. Blatt., p. 87. [♂, ♀, North America.]

1868. *Ischnoptera nigricollis* Walker, Cat. Blatt. Br. Mus., p. 118. [♂, Georgia.]

1903. *Ischnoptera johnsoni* Rehn, Ent. News, xiv, p. 234. [♂, St. Augustine, Florida.]

1903. *Ischnoptera intricata* Blatchley, Orth. of Indiana, p. 186. (In part.) [♂, Crawford County, Indiana.]

The extensive series now before us establishes beyond question the above synonymy. Both *nigricollis* and *johnsoni* were based on males of a rather small condition having unusually pale tegmina, which we find occurs only from southern Georgia to south-central peninsular Florida. The constancy of these differences over that area would suggest the presence of a geographic race, but even there rare exceptions occur and other series before us show that the size variation is decided, sometimes apparently due to geographic and sometimes evidently to individual variation, while occasional specimens are found having the tegmina paler than normal. This variant, occurring as the usual development over certain areas, is in many ways comparable with the black variant found in the grasshopper, *Romalea microptera*.[84] Such differentiation is almost certainly due to a response to conditions of local environment and probably is in no way a fixed hereditary feature, the differences in environment at certain localities bringing about such differences to varying degrees in a series from the same locality. We are strongly opposed to nominal designation of such chromatomorphs, but, if that course was pursued, a name of higher significance than "variety" or "color variant" could not be assigned without absolute error.

Unfortunately Rehn and Hebard described as the female of *johnsoni*, that sex of *Parcoblatta uhleriana*,[85] and in consequence placed *intricata*[86] of Blatchley incorrectly under *johnsoni*.

[84] See Rehn and Hebard, Proc. Acad., Nat. Sci. Phila., 1916, p. 194, (1916).

[85] All records of females of *I. johnsoni* in the literature are properly referable to *P. uhleriana*.

[86] This name was also primarily based on females of *P. uhleriana*.

When compared with the species of apparently nearest relationship, *I. vilis*,[87] the present insect is found to differ as follows: ♂ Lateral lobes of pronotum concolorous with disk, in *vilis* usually weakly, sometimes strongly, defined in a paler color; wings with mesal marginal area of costal veins often paler than the surrounding portions, in *vilis* darker; incomplete rami of ulnar vein normally oblique; supra-anal plate distinctly more produced; meso-distal production of subgenital plate more decided; styles of the general type found in *I. morio* and *I. rufa*, with dextral style distinctly the larger and armed on dorsal surface at apex only, in *vilis* the dextral style is very slightly the stouter, gradually tapering, with dorsal surface, from near the base, supplied with minute, chitinous spines; limbs normally unicolorous, in *vilis* the tibiae and tarsi are normally much paler than the other portions.

♀ Interocular space narrower and very dark; tegmina subquadrate with sutural margins attingent, in *vilis* lateral, broadly lanceolate, with sutural margins oblique to narrow, rounded apices.

The following features are of importance in distinguishing the species.

Male. (Plummer's Island, Maryland.) Size medium large, form moderately slender for the group. Interocular space slightly greater than interocellar space. Ocelli large, with flat surfaces rather sharply oblique to interocellar area, as in *morio*. Maxillary palpi rather short, fifth (distal) joint longer than third, fourth slightly shorter than third joint. Tegmina with point of greatest width meso-distad; discoidal sectors slightly radiating, those toward the sutural margin being distinctly oblique to that margin. Dorsal surface of abdomen with sixth and seventh segments alone specialized, showing the remarkable condition typical for the species of the genus.[88] Supra-anal plate margined proximad by concave distal margin of preceding segment, its surface there broken by a weak, but distinct, transverse suture; free margin straight and oblique laterad to mesal third which is transverse, the angles thus formed blunt. In the anal orifice, beneath the base of each cercus, a heavily chitinous arm is directed mesad, both tapering to their acute apices, the sinistral considerably the longer and, toward the apex, curved dorso-cephalad.

[87] 1869. *Ischnoptera vilis* Saussure, Rev. et Mag. Zool., Sér. 2, xxi, p. 112. [[♂], Argentine Republic.]

The above comparisons are made from the following material before us of this species.

Sapucay, Paraguay, X to III, 2, 1902 to 1904, (W. T. Foster), 11♂, [Hebard Cln. and A. N. S. P.].

Misiones, Argentina, XII, 12, 1910 and I, 1911, (P. Jorgensen), 2♂, [A. N. S. P.].

La Cumbre, Cordoba, Argentina, (C. Lizer), 1♂, 1♀, [A. N. S. P.].

[88] See generic description and pl. II, fig. 12.

Beneath these a number of chitinous plates and smaller projections occur in the anal orifice, dextrad among which is found the process which we term the genital hook in the species of *Parcoblatta*, here sharply recurved, much paler in color than the other chitinous processes, with recurved portion elongate, expanding slightly distad throughout, with a ventral, oblique cleft just before the rounded, hooded apex, giving the recurved portion a fanciful resemblance to a pitcher-plant. Subgenital plate convex, but with surface weakly concave at dextral portion of free margin and at sinistro-mesal distal portion; free margin dextrad rather decidedly convex to mesal point, there an irregularly rounded, sinistro-mesal production occupies half of the remaining distance to the sinistral cercus; the dextral margin of this production forming, at its base, a rectangle with the dextral portion of the free margin, remaining sinistral portion of free margin nearly straight, oblique, from base of production to base of cercus. Dextral style situated mesad on production at its apex, of same character as in *rufa;* sinistral style also as in that species, situated near sinistral base of production. Limbs and armament of same normal for the genus.

Female. (Washington, District of Columbia.) Agrees with male except in the following features. Size larger, form decidedly more robust. Eyes separated by a decidedly greater space, slightly greater than that between the small ocellar spots, which are situated in an area rounding gently into the plane of the interocellar space. Pronotum without discal sulci. Tegmina subquadrate, with sutural margins attingent, costal margin very weakly convex, rounding rather sharply into the very weakly oblique, nearly transverse, distal margin, which shows a weak concavity toward the apex of the anal vein, sutural margin similar to costal margin. Wings small atrophied pads, their apices extending nearly to the distal margins of the tegmina. Dorsal surface of abdomen unspecialized. Supra-anal plate not strongly triangularly produced, with lateral margins very weakly concave, nearly straight, and apex rather sharply rounded. Cerci slightly shorter and stouter than in male. Subgenital plate convex, hardly produced, with free margin very broadly and regularly convex.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Westville, New Jersey.....	15	3.8	5.1	16.8	5.2
Plummer's Island, Maryland..	16	3.8	5.1	17.2	5.3
Tryon, North Carolina.....	15.6	4	5.4	18.3	5.6
Raleigh, North Carolina.....	13.2	3.3	4.7	14.2	4.3
Raleigh, North Carolina.....	14.7	3.8	4.9	15.6	4.9
Clayton, Georgia.....	15.5	4	5.1	17.7	5.2
St. Simon's Island, Georgia...	11.7	3.3	4.3	13.3	4
Enterprise, Florida.....	13	3.7	4.6	14.1	4.3
Homestead, Florida.....	12.3	3.2	4.5	13.2	4.2
Homestead, Florida.....	13.3	4	5.1	15.8	4.7
Crawford County, Indiana....	13.7	4	5.3	18	5.3

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Mountain Grove, Missouri....	17	4.4	5.3	19.6	6
Waco, Texas.....	16.5	3.8	5	16.8	5.1
♀					
Reega, New Jersey.....	14.5	4.2	5.3	4.8	3.9
Reega, New Jersey.....	16	4.7	6.2	5.3	4.6
Washington, District of Columbia.....	15.5	4.7	6	4.9	4.1
Raleigh, North Carolina.....	13.3	4	5.2	3.8	3.4
Raleigh, North Carolina.....	16	4.6	6	5.2	4.3
Hebardville, Georgia.....	15.5	4.7	5.9	5.3	4.2
Jacksonville, Florida.....	11.4	4	4.9	4.3	3.4
Homestead, Florida.....	14.2	4.5	5.7	4.7	4
Homestead, Florida.....	14.7	5	6.9	5.2	4.2
Chokoloskee, Florida.....	17.8	5.2	7	5.3	4.7
Crawford County, Indiana....	15.8	4.7	6.4	5.1	4.3
Ottawa, Kansas.....	16	5	6.8	5.7	4.7
Mountain Grove, Missouri....	17	5.2	7.3	6.9	4.8

The considerable size variation shown appears to us to be due, in large part, to local environmental conditions rather than to geographic influences. It is evident, however, that the largest size development occurs toward the centers of maximum development of the vegetation of the Upper Austral Zone, and again in Tropical Florida.

Coloration.[89]—♂. General color of entire insect, except wings and limbs, shining blackish brown, on the tegmina becoming distad slightly paler, chestnut brown, and translucent. Ocelli and clypeus pale buff. Limbs and spines ochraceous-orange. Tegmina and wings often inconspicuously margined, in area of costal veins, with buffy. Wings transparent, washed with chestnut brown, this more decided in proximal portion of costal veins and distal area of anterior field, veins translucent chestnut brown. Only in the series from Crawford County, Indiana, are the trochanters and femora shining chestnut brown, strikingly darker than the tibiae and tarsi.[90]

[89] As we have noted in other species of Blattidae, individuals of this species are very pale in color after moulting, becoming darker very gradually and only attaining their full coloration when the chitin has fully hardened. Such specimens are sometimes difficult to determine. See footnotes 92 and 93.

[90] As originally described by Brunner, but clearly not the normal condition over the greater portion of the species' distribution.

♀. General color shining black, with a brownish tinge very weakly indicated. Ocellar spots pale buff. Clypeus and limbs kaiser brown.

Very rarely specimens are slightly paler in general coloration, but occasional individuals show the tegmina alone slightly paler than normal (1 ♂, Westville, N. J.; 1 ♂, 3 ♀, Raleigh, N. C.; 1 ♂, Asheville, N. C.; 1 ♂, Keokuk, Iowa; 1 ♂, Mountain Grove, Mo.), while the majority of specimens from southern Georgia and Florida, south as far as Lake Okeechobee (normal, from this region: 1 ♂, St. Simon's Island, Ga.; 1 ♀, Hebardville, Ga.), have the tegmina alone decidedly paler than normal, deep chestnut brown proximad shading rapidly to sudan brown, the entire tegmina having a purplish iridescence. The decidedly different appearance of this color variation has led to the synonymy discussed above.

In the present species the ootheca is carried with suture dorsad. The suture forms a conspicuous ridge with vertically fluted sides. The surface of the ootheca is apparently smooth, under a moderate magnification feebly shagreenous, with very faint traces of vertical division.

The species is known over the entire eastern United States as far north as West Creek and Westville, New Jersey; Enola, Pennsylvania; Marshall County, Indiana; west as far as Ottawa, Kansas, and Dallas, Kerrville and Victoria, Texas.

Specimens Examined:[91] 194; 91 males, 58 females and 45 immature individuals.

West Creek, New Jersey, VIII, 28, 1914, (Rehn; trapped in molasses jar in tangle of briars), 1 ♀, [A. N. S. P.].

Reega, Atlantic County, N. J., VII, 31 to VIII, 20, 1914, (Hebard; trapped in molasses jar in pine barrens), 9 ♀, 3 juv. ♀, [Hebard Cln.].

Swainton, N. J., VIII, 21, 1914. (Hebard; trapped in molasses jar in pine barrens), 1 juv. ♂, [Hebard Cln.].

Westville, N. J., VI, 6, 1 ♂, [Hebard Cln.].

Wayne, Delaware County, Pennsylvania, IV, 25, 1 juv. ♀, [Pa. State Dept. Zool.].

Enola, Pa., V, 11, 1907, 1 juv. ♂, [Pa. State Dept. Zool.].

Cumberland Valley, Pa., VIII, 1871, (Shaler), 1 juv. ♂, [M. C. Z.].

[91] All material previously recorded as *I. nigricollis* and all males as *I. johnsoni*, are correctly referable to the present species.

Washington, District of Columbia, VI, 1910, (W. T. Davis), 7 ♂, 6 ♀, [Davis Cln.]; VI, 2, 1901, 1 ♀, [U. S. N. M.]; 1 ♀, [Hebard Cln.].

Glen Echo, Maryland, VII, 10, 1914, (Hebard; under stone in heavy deciduous forest), 1 small juv. ♀, [Hebard Cln.].

Cabin John Run, Md., III, 21 and IX, 1911, (Knab; Davis), 3 juv. ♀, [U. S. N. M. and Davis Cln.].

Plummer's Island, Md., V, 24, 1914, (J. D. Hood), 2 ♂, [U. S. N. M. and Hebard Cln.]; VI, 18, 1908, (H. S. Barber), 2 ♂, [U. S. N. M.].

Virginia, near Washington, D. C., III, 25, 1883, 1 juv. ♂; V, 30 and VI, 7, 1883, 1 ♂, 1 ♀, [all Hebard Cln.].

Alexandria County, Virginia, IX, 1911, (W. T. Davis), 2 juv. ♀, [Hebard Cln.].

Great Falls, Va., VI, 1909 and 1910, (Knab; Davis), 3 ♂, 1 ♀, [U. S. N. M. and Davis Cln.].

Falls Church, Va., juv. taken IX, 29, 1903, (A. N. Caudell; bred, adult III, 7, 1904, died about IV, 28), 1 ♂, [U. S. N. M.].

Fredericksburg, Va., VII, 20, 1913, (Rehn and Hebard; under damp dead leaves on edge of forest), 1 ♂, [Hebard Cln.].

Tappahannock, Va., VI, 12, 1916, VI, 17, 1915, (H. Fox), 2 ♂, [Hebard Cln.].

Charlottesville, Va., VI, 15, 1914, (H. Fox), 1 ♂, [Fox Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 5, 1916, (Hebard; in forest, ♂ under stone, ♀ in dead leaves), 1 ♂, 1 ♀, [Hebard Cln.].

Appomattox Court House, Va., IV, 6, 1865, 1 juv. ♂, [M. C. Z.].

Montgomery County, Va., VI, 1, 1901, (E. A. Smyth Jr.), 1 ♂, [Hebard Cln.].

Raleigh, North Carolina, V, 24 to VII, 1, 1904 and 1905, (C. S. Brimley; many bred), 4 ♂, 11 ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

Southern Pines, N. C., VI, 3 to VII, 31, 1915, (A. H. Manee), 2 ♂, 4 ♀; X, 14, 1915, (A. H. Manee), 1 juv. ♂, [all Hebard Cln.].

Sulphur Springs, Buncombe County, N. C., VI, 13, 1904 and IX, 23, 1905, (Hebard), 1 juv. ♂, 1 juv. ♀; V, 8 and 10, 1904, (Hebard), 2 ♂, [all Hebard Cln.].

Tryon, N. C., V, 20, (W. F. Fiske), 1 ♂, [U. S. N. M.].

Spartanburg, South Carolina, VIII, 6, 1913, (Hebard), 1 juv. ♂, [Hebard Cln.].

Clayton, Georgia, 2000 feet, V, 18 to 26, 1911, (J. C. Bradley), 1 ♂, [Hebard Cln.].

Thompson's Mills, Ga., spring of 1909, (H. A. Allard), 1 juv. ♂, [U. S. N. M.].

Macon, Ga., VII, 30, 1913, (Rehn and Hebard; under oak leaves on edge of oak and short-leaf pine woods), 1 ♀, [Hebard Cln.].

Warm Springs, Ga., VIII, 9, 1913, (Rehn; running on ground), 1 ♀, [A. N. S. P.].

St. Simon's Island, Ga., VI, 8, 1911, (J. C. Bradley), 1 ♂, [A. N. S. P.].

Hebardville, Ga., V, 15, 1915, (Hebard; under rubbish in garden), 1 ♀, [Hebard Cln.].

Jacksonville, Florida, (T. J. Priddey), 2 ♂, 1 ♀, [Hebard Cln.].

St. Augustine, Fla., (C. W. Johnson), 1 ♂, *type* of *I. johnsoni*, [A. N. S. P.].

Ormond, Fla., III, 23, 1899, (W. S. Blatchley), 1 ♂[92], [Blatchley Cln.].

[92] This is a specimen which, killed when recently moulted, had not attained its full coloration. It was incorrectly recorded by Blatchley as *bolliana*.

River Junction, Fla., VIII, 31, 1915, (Hebard; under bark of pine log), 1 very small juv., [Hebard Cln.].

De Funiak Springs, Fla., IV, 7, (H. G. Hubbard), 1 ♂, [U. S. N. M.]; VIII, 30, 1915, (Hebard; in wire grass and sphagnum bordering stream thicket), 1 very small juv., [A. N. S. P.].

Cedar Keys, Fla., VI, 7, 1 ♂, [U. S. N. M.].

Enterprise, Fla., IV, 20 to V, 24, 4 ♂, [M. C. Z., U. S. N. M. and Hebard Cln.].

Sanford, Fla., (S. B. Frazer), 8 ♂, [M. C. Z.].

Lakeland, Fla., V, 7, 1912, (W. T. Davis), 1 ♀, [A. N. S. P.].

Lake Okeechobee, Fla., (E. Palmer), 3 ♂, 2 ♀, [M. C. Z.].

Fort Capron (present town of Viking), Fla., IV, 22, 1 ♀, [M. C. Z.].

Miami, Fla., II, 28, 1916, (Hebard; in leaf mould in Brickell's Hammock, bred adult V, 8, 1916), 1 ♂; III, 4 to 15, 1915, (Hebard; trapped in molasses jar in Brickell's Hammock), 1 juv. ♂, 1 juv. ♀; VIII, 15, 1903, (for Hebard), 1 ♀, [all Hebard Cln.].

Homestead, Fla., III, 17 to 19, 1910, (Hebard; rubbish about pot-hole in pine woods, *Pinus caraibea*), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀; VII, 10 to 12, 1912, (Hebard; under board on everglades), 1 ♂, 2 ♀, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

Detroit, Fla., VII, 12, 1912, (Rehn and Hebard; debris and leaf mould in hammock), 1 ♀, [A. N. S. P.].

Chokoloskee, Fla., IV, 8, 1912, (W. T. Davis), 1 ♀, [Hebard Cln.].

Everglade, Fla., IV, 1912, (W. T. Davis; trapped in sugar jar), 1 ♂, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1912, (Rehn and Hebard; debris and leaf mould in hammock), 1 ♂, 1 ♀, [Hebard Cln.].

Crawford County, Indiana, V, 9, 1894, (W. S. Blatchley), 1 ♂,[88] [Blatchley Cln.]; V, 25 to VI, 30, 1902 to 1904, (W. S. Blatchley), 4 ♂, 2 ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Pyriton, Clay County, Alabama, (H. H. Smith), 1 ♂, [U. S. N. M.].

St. Louis, Missouri, III, 27 to VI, 1904, (C. L. Heink), 1 juv. ♂, 3 juv. ♀, [Hebard Cln.].

Mountain Grove, Mo., IV, 1 to 21, 1914, (M. P. Somes), 4 juv. ♂, 1 juv. ♀; V, 26, 1916, (M. P. Somes; trapped, molasses jar), 1 ♂, 2 ♀; V, 16 to VI, 11, 1914 and 1915, (M. P. Somes), 6 ♂, 2 ♀; VIII, 14, 1916, (for Somes; trapped molasses jar), 2 ♀, [all Somes Cln.].

Arcadia, Louisiana, VIII, 20, 1915, (Hebard; dead oak leaves in heavy deciduous forest), 1 juv. ♂, [Hebard Cln.].

New Orleans, La., (Shufeldt), 1 juv. ♀, [U. S. N. M.].

Moscow, Iowa, V, 30, 1908, (M. P. Somes), 1 juv. ♀, [Somes Cln.].

Iowa City, Ia., VI, 12, 1915, (M. P. Somes), 1 ♀, [Hebard Cln.].

Keokuk, Ia., VI, 17, 1915, (M. P. Somes), 1 ♂, [Somes Cln.].

[88] This specimen Blatchley, with some doubt, described as the male of his *intricata*. This was partially due to the fact that, killed when recently moulted, it had not attained its full coloration.

Ottawa, Kansas, VI, 7, 1 ♀, [Univ. Kansas Cln.].
Paris, Texas, V, 20, 1904, (at light), 1 ♂, [U. S. N. M.].
Dallas, Tex., (J. Boll), 2 ♂, [M. C. Z.].
Waco, Tex., V, 11 to VI, 5, (Belfrage), 9 ♂, [M. C. Z. and Univ. Kansas Cln.].
Tiger Mills, Tex., II, 1885, (F. G. Schaupp), 1 juv. ♂, [Hebard Cln.].
Boerne, Tex., (in stomach of armadillo, *Tatu novemcinctum*), 1 juv. ♀, [U. S. N. M.].
Kerrville, Tex., VI, 6, 1906, (F. C. Pratt), 1 ♂, [U. S. N. M.].
Hockley, Tex., VI, 16, 1891, (F. W. Thouron), 2 ♂, 1 juv. ♂, [U. S. N. M.].
Victoria, Tex., IV, 5, 1907, (J. D. Mitchell), 1 ♂, [U. S. N. M.].

PARCOBLATTA[94] new name

1862. *Platamodes*[95] Scudder, Bost. Jour. Nat. Hist., vii, p. 417.

This genus was placed by Brunner in the synonymy under *Ischnoptera* in 1864[96]; which action has been generally followed by subsequent authors. Since that time no effort has been made until recently[97] to separate the genera of the Ischnopterites, all the species being referred without exception to *Ischnoptera*. Careful study of the very large series of this group before us shows this attitude to be untenable, and that numerous distinct genera have been included under *Ischnoptera*. One of these, to which belong the species assigned to *Platamodes* by Scudder, is amply distinct from *Ischnoptera* sensu strictiore, as may be seen by the characters given below.[98] To *Parcoblatta* belong all of the species of the Ischnopterites found native in the United States, excepting *Ischnoptera deropeltiformis* (Brunner) and *Symploce lita* Hebard. No purely exotic species of the genus are known to exist.

When compared with the species of *Ischnoptera*, those of the present genus are found to be separated by the different type of

[94] From *parca*=frugal. In allusion to the frugal habits of these insects. Living immature examples before us have been extremely active for months at night, a few bread crumbs and water apparently affording ample food.

[95] Preoccupied by *Platamodes* Menetries, (Coleoptera), described in 1849.

[96] Nouv. Syst. Blatt., p. 128.

[97] 1916. Hebard. "Studies in the Group Ischnopterites." Trans. Am. Ent. Soc., xlii, pp. 337–383.

[98] The original description is a useless comparison with *Periplaneta*, except that the male styles are described as being very short and turned abruptly downward.

pronotum in the males, and in females which have fully developed tegmina and wings,[99] the very different specialization of the male dorsal abdominal segments[100] and the unspecialized deflexed styles of the male subgenital plate. A much larger proportion of the species also have the females showing very decided reduction in the tegmina and wings.

Scudder's genus *Platamodes* was based on two species, the first and oldest of which we designate as genotype.

GENOTYPE here selected: *Parcoblatta pensylvanica* [*Blatta pensylvanica*] (De Geer).

Generic Description.—Pronotum weakly convex, becoming strongly so narrowly laterad; disk very weakly impressed, with oblique sulci very decided to subobsolete; caudal margin of pronotum convex.[101] In females with much reduced tegmina and wings the pronotum is more evenly and decidedly convex, the discal sulci obsolete and the caudal margin decidedly truncate.[102] Tegmina, as in *Ischnoptera*, with discoidal sectors (these including median and ulnar veins and their branches, of which the branches of the ulnar vein are the more numerous) weakly radiating, so that the branches near the sutural margin are weakly oblique to that margin. Wings with area between the discoidal vein and anterior margin broadest meso-distad, proportionately wider than in *Ischnoptera;* mediastine vein not extending half the distance to the apex of the wing, and from it spring very few of the costal veins; none of the costal veins enlarged distad; discoidal vein percurrent

[99] As in the majority of species of the Blattidae, in which the sexes show decided differences in the development of the organs of flight, the greatest reduction occurs in the female sex. Accompanying this, a pronotal modification is almost always found, the surface becoming more evenly and strongly convex and the caudal margin decidedly more truncate. Thus the usual condition gives us the anomaly of the most differentiated type (the female) being much the simplest in general structure; this being true, not only for pronotum, tegmina and wings, but also for the head, abdominal segments and genitalia.

[100] In *bolliana* and *desertae* alone, no specialization occurs in the male median and dorsal abdominal segments, the general facies and other features serving to place them without question in the present genus.

[101] The pronotum and tegmina, these latter chiefly proximad, are supplied with scattered hairs in specimens having fully developed organs of flight. In males of *zebra* these are very numerous, but in males of *bolliana* the greatest abundance is found.

[102] See footnote 99, and Hebard, Trans. Am. Ent. Soc., xlii, p. 166, footnote 23, (1916).

to apex of wing, without rami and with perpendicular veinlets connecting with median vein weakly defined or obsolete; ulnar vein weakly curved, with one to six proximal incomplete rami and four to eight complete rami;[103] no intercalated triangle present.[104] Males with median and first dorsal abdominal segments specialized, but without any distinct modification of the remaining segments, or with median segment alone specialized, or with all segments unspecialized.[105] Styles of male subgenital plate represented by slender, deflexed, similar, cylindrical processes with rounded apices, the dextral slightly the longer, both entirely unarmed. Armament of limbs of same character as that of *Ischnoptera*. Cephalic femora with ventro-cephalic margin armed with (usually three to six) heavy, elongate, well separated, proximal spines, succeeded by a row of minute, closely set, piliform spines, which is terminated distad by three heavy, elongate (in increasing ratio) spines. Other ventral margins of femora supplied with widely separated, heavy, elongate spines. A single small rounded pulvillus present distad on each of the four proximal tarsal joints. Small arolia present.

The species of the present genus all have a general facies which differs from that of the species of either *Ischnoptera* or the more widely separated genus *Symploce*. In all but one species, *P. caudelli*, the females show, to different degrees, notable reduction in the organs of flight. It is clear that the degree or character of such reduction is valueless in determining the relationship of the various species; for in many cases, species showing distinctive characters which must be considered evidences of close affinity, have, in the female sex, wide differences in the alar features. Such reduction, however, probably affords the best means of determining the relative antiquity of the various species, their common

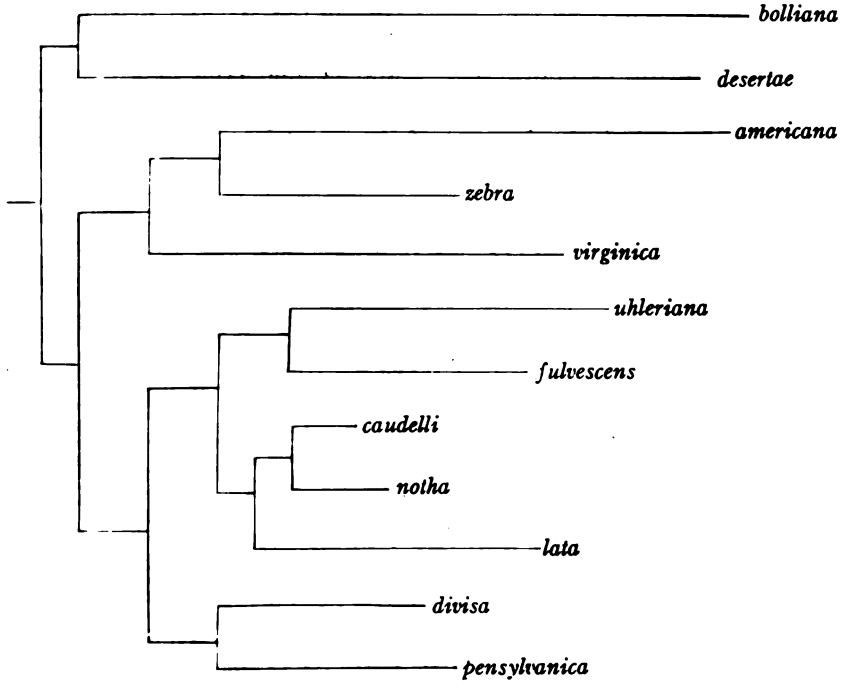
[103] Very rarely an abnormal individual of the present genus is found having no incomplete rami of the ulnar vein. Though the venation is extremely useful in determining the generic position of material of the group in the large majority of cases, we must bear in mind that variation is more liable to occur than in the more important features such as sexual specialization or character of limb armament.

[104] The tegminal and wing features naturally can not be observed in females of species in which the reduction of these organs is decided.

[105] The remarkable character of the specialization of the fifth and sixth dorsal abdominal segments in males of *Ischnoptera* is found in all the species of that genus.

ancestor probably having been an insect with fully developed organs of flight in both sexes.[106] The species are each distinctive to a degree in some feature; so striking is this that logical division of the genus into groups is out of the question.

The following diagram best indicates the relationship and proper position of the species.



As indicated above, greatest probable divergence from the common ancestor is shown by the female tegminal reduction in *bolliana* and *americana*, least differentiation in this respect in *caudelli*. The character of the median and first dorsal abdominal segments in the male, we believe, affords the best guide to determine the specific relationships. It is of further interest to note that the general character of the male supra-anal plate is the same in *bolliana*, *desertae* and *virginica;* in *americana* and *notha;* in *zebra*, *uhleriana*[107], *fulvescens*, *caudelli* and *lata*, and in *divisa* and *pensylvanica*.

[106] See page 10.

[107] In this species, showing a certain degree of divergence toward the type found in *americana* and *notha*.

Other particularly distinctive features are: the proportionately somewhat broader tegmina in males of *virginica* and *uhleriana;* the specialization of the cercal joints in males of *uhleriana* and remarkably distinctive ootheca of that species; the production of the dorsal surface of the male subgenital plate at the base of the dextral style in *fulvescens*, and the less radiating, nearly longitudinal, discoidal sectors in the male tegmina of *zebra*. The last feature given for *fulvescens* is somewhat variable and to a certain degree geographic in character. Such is also true of an unusual cephalic flattening of the head found in *divisa* and specialization of the cercal joints in both sexes of *pensylvanica*.[108]

Key to Males

(*Primarily based on the Specialization of the Median and First Abdominal Segments*)

A. Dorsal surface of abdomen unspecialized.
  B. Interocular space no wider than that between ocelli. Head dark colored. Sulci of pronotal disk very decided.....**bolliana** (Saussure and Zehntner)
  BB. Interocular space much wider than that between ocelli. Head pale. Sulci of pronotal disk moderately decided.....**desertae** (Rehn and Hebard)
AA. Dorsal surface of abdomen specialized.
  B. Median segment alone specialized.
    C. Median segment with a single specialized area.
      D. Specialized area represented by a moderately large, mesal portion supplied with minute, scattered hairs.....**virginica** (Brunner)
      DD. Specialized area represented by a tuft of agglutinated hairs.
        E. This tuft small and quadrate, remaining portion of segment showing little specialization.....**americana** (Scudder)
        EE. This tuft larger and much broader, remaining portion of segment showing further specialization.....**zebra** new species
    CC. Median segment with twin specialized areas.
      D. These specialized areas represented by weakly raised mesal ridges, with brief cephalic faces supplied with a heavy tuft of hairs.
        E. Pronotum proportionately shorter, with point of greatest width mesad. Tegmina much broader than pronotum. Cerci with inner distal angles of sixth to ninth joints acutely but briefly produced. Subgenital plate at base of dextral style not elevated.....**uhleriana** (Saussure)

[108] The instability of these features prevents nominal recognition, though it probably indicates the incipient stages of geographic racial development.

EE. Pronotum proportionately longer, with greatest width slightly caudad of mesal point. Tegmina little broader than pronotum. Cerci simple. Subgenital plate at base of dextral style decidedly elevated.[109]

fulvescens (Saussure and Zehntner)

DD. These specialized areas represented by decided mesal ridges, overhanging the segment which is concave cephalad, ventral faces of overhanging extremities heavily supplied with short hairs.

divisa (Saussure and Zehntner)

BB. Median and first dorsal abdominal segments similarly specialized, (each with twin specialized areas).

C. These specialized areas represented on each segment by moderately decided, to weak, elevations, with brief cephalic faces supplied with a heavy tuft of hairs.

D. These elevations moderately decided. Supra-anal plate with a transverse mesal production, which is strongly deflexed. (Size rather large. Form slender. Pronotum proportionately unusually long; length 3.8 to 4.3, width 4.8 to 5.3 mm.).....**notha** (Rehn and Hebard)

DD. These elevations weak. Supra-anal plate triangularly produced with apex rounded and distal portion not suddenly deflexed.

E. Size medium. Form moderately slender. Pronotum; length 2.9 to 3.4, width 3.9 to 4.7 mm.....**caudelli** new species

EE. Size large. Form robust. Pronotum; length 4.2 to 5.2, width 5.4 to 6.7 mm.....**lata** (Brunner)

CC. These specialized areas represented on each segment by very decided elevations, overhanging the segments which are concave cephalad, ventral faces of overhanging extremities heavily supplied with hairs.

pensylvanica (DeGeer)

Key to Females

(*Primarily based on Tegminal and Wing Characters*)

A. Wings absent. (Tegmina very greatly reduced, represented by very small, lobiform, lateral pads.)

B. Form compact. Interocular space subequal to that between antennal sockets. Tegmina showing hardly any traces of venation. Supra-anal plate rather weakly produced, with lateral margins convergent to broadly rounded apex.....**bolliana** (Saussure and Zehntner)

BB. Form normal, not as compact. Interocular space appreciably wider than that between antennal sockets. Tegmina with apparent venation. Supra-anal plate normally produced, with lateral margins convergent to rather sharply rounded apex.....**americana** (Scudder)

AA. Wings present.

B. Tegmina decidedly, to greatly, reduced.

[109] This development is found to be normally very weakly indicated in material from the southwestern portion of the species' distribution.

C. Tegmina represented by subtriangular, lateral pads. Wings vestigial.
D. Tegmina elongate, subtriangular, lateral pads. General coloration very pale. Supra-anal plate with lateral margins at bases of cerci showing a very broad and weak triangular production. . **desertae** (Rehn and Hebard)
DD. Tegmina roundly subtriangular, lateral pads. General coloration ferruginous to very dark. Supra-anal plate with lateral margins convergent and weakly concave. . . . . **uhleriana** (Saussure)
CC. Tegmina represented by subquadrate, slightly overlapping pads. Wings greatly reduced.
D. Tegmina truncate distad, this commencing at apex of anal field.
E. Size rather small, form relatively slender. Pronotum; length 3.2 to 3.8, width 4 to 4.9 mm. General coloration normally more hazel. Margin of sixth dorsal abdominal segment weakly convex mesad. Supra-anal plate with lateral margins normally straight and convergent to sharply rounded apex. . . . . **virginica** (Brunner)
EE. Size medium, form broad. Pronotum; length 3.1 to 4.9, width 4.6 to 6.6 mm. General coloration normally kaiser brown and blackish brown. Margin of sixth dorsal abdominal segment distinctly convex mesad. Supra-anal plate with lateral margins normally convergent and rather feebly concave to rather bluntly rounded apex.
fulvescens (Saussure and Zehntner)
DD. Tegmina truncate distad, this commencing beyond apex of anal field. (Size very large, form very robust. Pronotum; length 4.8 to 6.1, width 6.8 to 8.2 mm. General coloration kaiser brown, hays russet and blackish brown. Sixth dorsal abdominal segment and supra-anal plate as in *fulvescens*. . . . . **lata** (Brunner)
BB. Tegmina only moderately reduced, neither lateral or truncate distad.
C. Tegmina with apices not reaching beyond apex of supra-anal plate. Sustained flight impossible.
D. General color ochraceous-tawny. . . . . **notha** (Rehn and Hebard)
DD. General coloration dark brown with various paler markings.
E. Dorsal surface of abdomen buffy, heavily banded with brown.
zebra new species
EE. Dorsal surface of abdomen not banded.
F. Size normally smaller. Pronotum; length 3.7 to 4.9, width 4.7 to 6.6 mm. Coloration normally less solid, with lateral margins of pronotum less strikingly pale.[110] . . . . . **divisa** (Saussure and Zehntner)
FF. Size normally larger. Pronotum; length 4.3 to 5.8, width 5.1 to 7.2 mm. Coloration normally more solid, with lateral margins of pronotum more strikingly pale. . . . . **pensylvanica** (DeGeer)
CC. Tegmina with apices reaching beyond apex of supra-anal plate. Sustained flight possible. (General color ochraceous-tawny.) . . . . **caudelli** new species

[110] Head decidedly more flattened in material from the southwestern portion of the species' distribution.

Though this key may be useful in determining the majority of specimens encountered, variation in all the features known for the separation of females constantly occurs. Use of a key, without reference to the known specific variability and unusual features, can only lead to occasional serious mistakes. This is particularly true in such species as *divisa* and *pensylvanica*, where sufficient variation occurs in each, toward the other, to make determination of occasional specimens extremely difficult, even when the specific range of variation in all features is carefully considered.

The genus is distributed generally over the United States, being absent apparently only in the Cordilleran region from Colorado northward and in almost the entire area of the Great Basin. Few species reach beyond the Canadian boundary, and these only in the East. The most northern records for the genus are Orono, Maine; Abbotsford and Montreal, Quebec; Sudbury, Ontario; Polk County, Wisconsin; eastern Nebraska; Fort Davis, Texas; Prescott, Arizona; Verdi, Nevada, and Oregon. Southward the genus will assuredly be found in adjacent Mexico, probably quite extensively over the northern plateau and mountains. For those regions, however, the genus is yet known from but a single "Lower California" record of *americana*.

In the present study of *Parcoblatta*, 2852 specimens have been examined, of which 2025 are in the Philadelphia collections.

Parcoblatta bolliana (Saussure and Zehntner) (Plate III, figures 1 to 3.)

1893. *Ischnoptera bolliana* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 4. [♂: New Mexico, and Texas.]

1904. *Kakerlac schaefferi* Rehn, Psyche, xi, p. 72. [♀, Esperanza Ranch near Brownsville, Texas.]

The above synonymy has been indicated by Rehn and Hebard,[111] *schaefferi* having been based on the then unrecognized female of this species.

This insect is very distinct from any other of the genus. The males of this species and of *P. desertae* differ, from all other known males of the genus, in the unspecialized median and dorsal abdominal segments. The females, with those of *P. americana*, show the greatest tegminal reduction found in this sex of the genus;

[111] Proc. Acad. Nat. Sci. Phila., 1910, p. 449, (1910).

similar, but more ample, lateral subtriangular pad-like tegmina are, however, found in the females of *P. desertae* and *P. uhleriana*.

Compared with *desertae*, the males are found to differ: in the narrower interocular space; dark colored head, even in the palest specimens; more pronounced pronotal sulci; distinctly more produced supra-anal plate, with free margin less truncate between the cerci; shorter cerci with joints decreasing more rapidly in size distad, and more nearly symmetrical subgenital plate, the plate at the dextral style not being more produced than at the sinistral style, the margin between these transverse.

The very dark females, with minute, lateral tegmina, which scarcely extend beyond the caudal margin of the metanotum, could only be confused with those of *americana*. The present species averages smaller, and the females are more compact, with interocular space equalling that between the antennal sockets, with tegmina showing hardly any traces of venation and with supra-anal plate less strongly and more bluntly produced.

Characters of Male.—(Waco, Texas.[112]) Size small for the genus, form slender. Interocular space four-fifths (varying in the series to fully as wide as) interocellar space. Ocelli well defined. Area between eyes and ocelli appreciably flattened to a point just above the antennal sockets, with surface slightly roughened and showing microscopic transverse folds. Maxillary palpi delicate, with third and fifth (distal) joints subequal in length, each longer than fourth joint. Pronotum with greatest width slightly caudad of mesal point, oblique sulci of disk very decided and connected caudad by a short, transverse, arcuate impression. Tegmina and wings normal, fully developed; wings (in the series) with two to five incomplete and two to five complete rami of the ulnar vein. Median and dorsal abdominal segments unspecialized. Supra-anal plate weakly deplanate and weakly declivent distad, about twice as broad as long, free margin convex from above the cerci, but with mesal portion showing some weakening of the curvature. Cerci short with nine (normal) distinct joints, these decreasing rapidly in size distad. Genital hook situated sinistrad, a sharply recurved chitinous process, with recurved portion straight and very elongate and directed almost parallel to the basal shaft; mesad and adjacent, is situated a very slender and much shorter, moderately curved, aciculate, chitinous process. Subgenital plate with surface moderately convex except distad, where it is weakly deplanate; lateral third of free margin, on each side, nearly straight and moderately convergent, mesal third nearly straight, transverse; at the distal angles thus formed are situated, in weakly defined sockets, simple slender styles, similar in size and form and in length equal to half the distance between their bases. Exposed portion of eighth dorsal abdominal segment, which

[112] The "Texas" type was probably taken at Dallas, or at this not distant locality.

is folded ventrad over the base of the subgenital plate, decidedly elongate, nearly twice as long as exposed portion of seventh ventral abdominal segment.

The transverse flattening of the distal margin of the supra-anal plate is in some males before us very weakly defined, in occasional specimens pronounced. Numerous microscopic hairs are present on pronotum and tegmina.

Characters of Female.—(Austin, Texas.) Size small, form ellipitical, stout and compact, with dorsal surface moderately convex and glabrous. Head much larger, distinctly broader and more convex than in male. Interocular space subequal to that between antennal sockets; minute ocellar spots present. Maxillary palpi short and stout. Pronotum decidedly broader, convex and smooth, without sulci; caudal margin transverse with a very weak convexity, lateral margins finely but distinctly cingulate. Tegmina lobiform, lateral, widely separated, extending very slightly beyond caudal margin of mesonotum, surface glabrous with hardly a trace of venation, costal margins finely but distinctly cingulate. Wings absent. Supra-anal plate with a blunt, medio-longitudinal carina, rather weakly produced, lateral free margins beyond cerci very weakly convex, convergent to the broadly rounded apex. Cerci very short, lateral margins entire, dorsal surface deplanate. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tryon, North Carolina (9)	10.2–11.8	2.7–2.9	3.6–4	12.2–13.6	4–4.4
Brunswick, Georgia...	11	2.7	3.8	12.1	3.9
Iowa City, Iowa.....	12.8	3	4.2	13.3	4.6
Mountain Grove, Missouri.....	12.3	2.8	3.8	13.1	4.3
Waco, Texas..... (11)	10.1–12.3	2.7–2.9	3.7–3.9	11.7–12.3	3.8–4
♀					
Raleigh, North Carolina (4)	9.7–10.7	2.9–3	4.3–4.4	1.7–1.8	1.4–1.6
Atlanta, Georgia.....	9.8	3	4.1	1.8	1.6
Austin, Texas.....	9	2.8	4.1	1.9	1.7
Sabinal, Texas.....	9.8	2.9	3.9	1.7	1.6
Brownsville, Texas....	10.4	3	4	1.8	1.6

Little variation is found in the species, except the striking color differences shown by the males of the extremes of intensive and recessive coloration.

Coloration.—♂. (Intensive.) Head shining blackish chestnut brown, ocelli light buff; antennae dark dresden brown. Coxae, limbs, lateral margins of pronotum and marginal field of tegmina buckthorn brown. Abdomen and remaining portion of pronotum (the transition there not sharply defined) shining blackish chestnut brown, the latter with a mesal ochraceous area between the

discal sulci. Tegmina of the same color proximad, translucent; fading toward buckthorn brown distad. This condition is normal in eastern material, showing individual different degrees of intensity in each series. The material from Kansas, Oklahoma and Brownsville, Texas, is about intermediate, while the remaining Texan series show individuals which are moderately paler or of the extreme recessive coloration. (Recessive.) General color of entire insect ochraceous-buff, becoming paler on lateral margins of pronotum and marginal field of tegmina and ochraceous-tawny toward the subgenital plate. Head shining blackish chestnut brown, ocelli light buff, clypeus of the general coloration. No exceptions to the very dark cephalic coloration appear to occur. ♀. Shining blackish chestnut brown, femora slightly paler, remaining portions of limbs and the cerci dark chestnut. Minute ocellar spots buffy.

The ootheca is carried with suture laterad. Its surface is smooth, with rather widely spaced transverse divisions. The suture bears minute, rather widely separated knobs; these are, however, less widely spaced than the transverse divisions.

This species is not as frequently encountered as many of the genus. Its range is known to extend from Raleigh, North Carolina and Brunswick, Georgia,[113] westward to the Mexican border. Though described, in part, from New Mexico, our most western records are Ellis, Kansas and Rio Frio, Texas. Northward in the Mississippi Valley region, it is known as far as Nebraska City, Nebraska and Iowa City, Iowa.

Specimens Examined: 86; 72 males, 12 females and 2 immature individuals.

Raleigh, North Carolina, V, 8 to VI, 21, 1904 and 1905, (C. S. Brimley; bred and at light), 7 ♂, 4 ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

Tryon, N. C., V, 20, (W. F. Fiske; at light), 1 ♂; (W. F. Fiske), 10 ♂, [all U. S. N. M.].

Sulphur Springs, near Asheville, N. C., V, 26 to VI, 9, 1904, (Hebard; rare at light), 5 ♂, [Hebard Cln. and A. N. S. P.].

Swansea, South Carolina, VI, 1908, (C. C. Craft), 1 ♂, [U. S. N. M.].

Clayton, Georgia, 2000 to 3700 feet, VI, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Atlanta, Ga., VII, 6, 1909, 1 ♂, [A. N. S. P.].

[113] Blatchley's record of this species from Ormond, Florida, is properly referred to *I. deropeltiformis* in the present paper.

Brunswick, Ga., 1 ♂, [A. N. S. P.].
Southern Illinois, (C. Thomas), 1 ♂, [M. C. Z.].
Iowa City, Iowa, VI, 12, 1915, (M. P. Somes), 1 ♂, [Somes Cln.].
Keokuk, Ia., VI, 17, 1915, (M. P. Somes), 1 ♂, [Hebard Cln.].
Mountain Grove, Missouri, V, 14 and 16, 1914, (M. P. Somes), 1 juv. ♂, 1 juv. ♀; VI, 17, 1914, (M. P. Somes), 1 ♂; VII, 21, 1916, (for Somes; trapped, molasses jar), 1 ♂, 1 ♀, [all Somes Cln.].
Baton Rouge, Louisiana, VI, 1905, (A. W. Morrill; at light), 1 ♂, [U. S. N. M.].
Nebraska City, Nebraska, VI, 1 ♂, [Hebard Cln.].
Lawrence, Kansas, VI, (E. S. Tucker), 2 ♂, [Univ. Kansas Cln.].
Douglas County, Ks., VI and VII, (E. S. Tucker), 2 ♂, [Univ. Kansas Cln.].
Wichita, Ks., VI, 17, 1904, (F. B. Isely), 1 ♂, [U. S. N. M.].
Ellis, Ks., (L. Watson), 1 ♂, [M. C. Z.].
Stillwater, Oklahoma, 1897, (A. B. McReynolds), 1 ♂, [U. S. N. M.].
Perkins, Okla., (A. N. Caudell), 1 ♂, [U. S. N. M.].
Paris, Texas, V, 11 to 20, 1914, (at light), 10 ♂, [U. S. N. M.].
Waco, Tex., V, 20 to VII, 10, (Belfrage), 12 ♂, [M. C. Z.].
Hockley, Tex., (F. W. Thouron), 1 ♂, [U. S. N. M.].
Dickinson, Tex., VII, 20, 1912, (Hebard; under dry cow dung in pine woods), 1 ♀, [Hebard Cln.].
Round Mountain, Tex., 2 ♂, [A. N. S. P.].
Austin, Tex., (W. M. Wheeler), 1 ♀, [Am. Mus. Nat. Hist.].
Rio Frio, Tex., V, 10, 1910, (F. C. Pratt; at light), 1 ♂, [U. S. N. M.].
Sabinal, Tex., VI, 2, 1910, (F. C. Pratt), 1 ♀, [U. S. N. M.].
Sharpsburg, Tex., V, 10, (E. A. Schwarz), 1 ♂, [U. S. N. M.].
Nuecestown, Tex., IV, 27, 1896, (Marlatt), 1 ♀, [U. S. N. M.].
San Diego, Tex., VI, 12, (E. A. Schwarz), 1 ♂, [U. S. N. M.].
Brownsville, Tex., V, (H. S. Barber), 1 ♀, [U. S. N. M.].
Esperanza Ranch, near Brownsville, Tex., V, (C. Schaeffer), 2 ♂, 1 ♀, latter *type* of *K. schaefferi* Rehn, [Bklyn. Inst.].
Point Isabel, Tex., V, 11, 1904, (H. S. Barber), 1 ♀, [U. S. N. M.].

Parcoblatta desertae (Rehn and Hebard) (Plate III, figures 4 to 6.)

1903. *Ischnoptera bolliana* Rehn (not of Saussure and Zehntner, 1893), Ent. News, xiv, p. 325, 330. (In part.) [♂, Shovel Mountain, Texas.].
1909. *Ischnoptera desertae* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 116, fig. 1. [♀, Johnstone, Valverde County, Texas.].
1910. *Ischnoptera insolita* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 450, fig. 27. (In part.) [2 ♂, Shovel Mountain, Texas.].
1912. *Ischnoptera insolita* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 104. [Single type designated: ♂, Shovel Mountain, Texas.]

The male sex, described as *I. insolita*, is shown unquestionably by the series now before us to represent that sex of the present

species. Rehn and Hebard's revision of 1912 was undertaken primarily for the purpose of showing that the genera *Temnopteryx*, *Kakerlac* and *Loboptera* had in reality no place among the forms found in the United States, and for giving additional information on the majority of the species. At that time the available material was admittedly insufficient to place correctly all of the species and associate their sexes.

The present species shows nearest relationship to *P. bolliana*, the males differing conspicuously in the features given in the comparison with that species on page 78. The females are readily distinguished by their paler coloration; width of interocular space, which is slightly but distinctly greater than that between the antennal sockets; decidedly more elongate tegmina, which, however, are also lateral, and presence of vestigial wings. The female supra-anal plate is more sharply produced, in this respect agreeing more nearly with *P. americana*, but with lateral free margins beyond the cerci not as decidedly concave as in that species.[114]

Characters of Male.—(Sabinal, Texas.) Size small for the genus, form slender. Interocular space faintly narrower than that between the antennal sockets, much wider than that between the ocelli. Ocelli well defined. Head more evenly rounded than in *bolliana*, with inter-ocular-ocellar area glabrous, showing a few microscopic pits. Maxillary palpi slightly heavier than in *bolliana*. Pronotum deeper than in that species; with greatest width distinctly caudad of mesal point; oblique sulci moderately decided, but by no means as pronounced as in *bolliana*. Tegmina and wings normal, fully developed; wings (in the series) with one to three incomplete and three to five complete rami of the ulnar vein. Median and dorsal abdominal segments unspecialized. Supra-anal plate strongly transverse, fully three times as broad as long, free margin beyond the cerci weakly convex and broadly, though weakly, flattened mesad, of a somewhat similar type to that of *bolliana*, but showing decidedly greater truncation.[115] Cerci more elongate than in *bolliana*,[116] decreasing more evenly and less rapidly in size distad. Genital hook situated sinistrad, a sharply recurved, chitinous process, with recurved portion moderately elongate, stouter and shorter than in *bolliana* and not as strongly recurved; mesad and adjacent is situated a very slender, elongate, very weakly curved, aciculate process.

[114] Females are fully compared with that sex of *P. uhleriana*, under that species.

[115] The meso-distal portion of this plate is normally bent slightly downward; its degree of truncation is variable, a male from the Chisos Mountains, Texas, showing an even convexity of this margin, while that from Rio Frio, Texas, shows a blunted, rotundato-trigonal condition.

[116] The series shows eight to ten, normally nine, distinct joints.

Subgenital plate with surface weakly convex, except disto-laterad toward base of styles, where it is weakly concave, free margin briefly produced and straight laterad, then in lateral third of remaining portion, on each side, moderately concave, the remaining distal third nearly transverse, showing a weak concavity and a very slightly greater dextral production of the plate; at the disto-lateral angles thus formed are situated, in sockets whose dorsal surfaces are weakly raised on the dorsal surface of the plate,[117] simple, slender styles, similar in size and form and in length equalling two-fifths the distance between their bases. Exposed portion of eighth dorsal abdominal segment, which is folded over the base of the subgenital plate, short, no longer than the exposed portion of the seventh ventral abdominal segment.

Characters of Female.—(*Type.* Johnstone, Valverde County, Texas.) Size small, not as compact as in *bolliana*. Head larger and more convex than in male. Interocular space considerably wider than that between antennal sockets; minute ocellar spots present. Maxillary palpi short and stout. Pronotum proportionately longer than in *bolliana*. Tegmina elongate, lateral pads, with apices rounded, widely separated, reaching base of median segment, surface with veins appreciable, weakly convex to marginal field, which is weakly concave, with costal margin cingulate. Wings represented by small, vestigial pads, falling distinctly short of the tegminal apices. Supra-anal plate triangularly produced, free margins at bases of cerci showing a very broad and weak triangular production, thence concavo-convergent to the slightly blunted apex. Cerci very short, lateral margins entire, with dorsal surface weakly convex. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen[118]	Width of tegmen
Shovel Mountain, Texas	(2)	12–12.2	2.8– —	3.8– —	11.2–12	3.6–3.7
Rio Frio, Texas		13.5	3.1	4.1	12.3	3.8
Sabinal, Texas	(2)	11.3–13.3	3.1–3.1	4–4.1	12–12.7	3.9–4
Chisos Mountains, Texas	(2)	13.2–13.8	3.2–3.3	4–4.3	13.6–14.5	4.6–4.8
♀						
Johnstone, Texas, *type*.		9.5	3	4.2	3	2.1
Fort Davis. Texas	(2)	12–11.5	3.2–3.6	4.4–4.8	3.5–3.4	2.3–2.3
Chisos Mountains, Texas		11.6	3.3	4.7	3.4	2.2

The type was taken in a relatively bare area of reduced vegetation, which probably accounts for its small size and certainly explains its pale coloration. The other females are all from more mountainous localities, these regions showing generally a decidedly less reduced vegetation.

[117] This convexity is slightly more pronounced at the dextral socket.

[118] The length of the exposed portion of the female tegmen is given.

Coloration.— ♂. General coloration light ochraceous-buff, becoming ochraceous-buff on the pronotal disk and tawny mesad and distad on the ventral surface of the abdomen. Eyes blackish brown. Tegmina semi-transparent, ochraceous-buff, with marginal field light ochraceous-buff. Wings hyaline, the area of the costal veins and distal portion of the anterior field weakly tinged with buffy.

♀. (*Type.* Recessive.) Head, pronotum and ventral surface of abdomen dull ochraceous-orange, the lateral portions of the pronotum shading to ochraceous-buff. Tegmina transparent ochraceous-buff. Mesonotum, metanotum and dorsal surface of abdomen russet. Limbs buff. (Other females. Intensive.) Head, pronotum, mesonotum and metanotum russet, the pronotum shading to ochraceous-tawny laterad. Abdomen shining blackish brown, tinged with russet ventro-mesad. Tegmina transparent russet, with marginal field ochraceous-tawny. Limbs ochraceous-buff, tinged with tawny distad.

The known material of the present species is recorded below; from the mountains, arid and sub-arid regions of central, south-central and western Texas. Doubtless it is widely distributed over the similar adjacent regions in Mexico.

Specimens Examined: 13; 9 males and 4 females.

Shovel Mountain, Burnet County, Texas, VII, 21 and 25, 1901, (F. G. Schaupp), 2 ♂, *type* and *paratype* of *I. insolita* Rehn and Hebard, [A. N. S. P.].

Rio Frio, Tex., V, 11, 1910, (F. C. Pratt), 1 ♂, [U. S. N. M.].

Sabinal, Tex., V, 26, 1910, (F. C. Pratt; at light), 2 ♂, [U. S. N. M.].

Nueces River, Zavalla County, Tex., VI, 29, 1910, (F. C. Pratt), 2 ♂, [U. S. N. M.].

Johnstone, Tex., VII, 8, 1907, (Hebard; under small boulder on desert), 1 ♀, *type*, [Hebard Cln.].

Fort Davis, Tex., VII, 11, 1911, (H. A. Wenzel), 2 ♀, [A. N. S. P. and Hebard Cln.].

Chisos Mountains, Tex., VI, 10 to 12, 1908, (Mitchell and Cushman; at light), 2 ♂, [U. S. N. M.]; VII, 22, 1911, (H. A. Wenzel), 1 ♀, [A. N. S. P.].

Parcoblatta americana (Scudder) (Plate III, figures 7 to 9.)

1900. *Loboptera americana* Scudder, Proc. Davenport Acad. Sci., viii, p. 93, pl. 2, fig. 4. [1 ♀, Ehrenberg, Arizona.]

1910. *Ischnoptera americana* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 420, figs. 7 and 8. [♂, ♀: Oregon; Ormsby County, Nevada; Bair's Ranch, San José, Los Angeles and Pasadena, California; Lower California.]

The present species has been twice incorrectly recorded as *I. consobrina* Saussure, by Rehn in Baker, and by Rehn and Hebard, while the California males included with the original description of *I. notha* by the latter authors, are here correctly referred to the recessive color condition found in the present species.

Great variation is found both in size and color in this species, due probably to environmental conditions and, particularly, to the effect of different degrees of aridity.

The males showing intensive coloration are much darker than this sex of any other solidly colored species of the genus. They agree with *P. bolliana* in the normally very decided pronotal sulci, while the head is also darkened even in the palest examples. The gland development of the median segment is distinctive, the nearest similarity being found in *P. zebra*. The supra-anal plate suggests a further development of the type found in *P. notha*.

The female shows nearest resemblance to that sex of *P. bolliana*, but is readily separated by the features discussed under that species.

Description of Male.—(Pasadena, California.) Size rather small, form slender. Interocular space about as wide as the space between the antennal sockets. Ocelli not strongly defined, so that the space between the antennal sockets is very slightly wider than that between the ocelli. Area between eyes and ocelli weakly convex, much as in *P. desertae*, but microscopically roughened, with more pronounced pits. Pronotum and discal sulci much as in *bolliana*, but with point of greatest width slightly more caudad. Tegmina and wings normal, fully developed. Wings with distal branches of discoidal vein longer and with more forks than is usual in *bolliana* or *desertae;* ulnar vein (in series) with three to five incomplete and four to six complete rami. Median segment with a small, quadrate, mesal tuft of agglutinated hairs; other dorsal segments unspecialized. Supra-anal plate deplanate, declivent distad (or with meso-distal produced portion decidedly deflexed),[119] about twice as broad as long, lateral margins weakly convex-convergent to within cercal bases, then concave-convergent to broadly rounded apex. Cerci elongate, tapering rather evenly to apex, with (normally) eleven distinct joints.[120] Genital hook situated sinistrad, a sharply recurved, chitinous process, with recurved portion moderately

[119] From the material at hand, it appears that this portion of the plate can, in life, be deflected at will by the insect; dried specimens, showing a strong deflection, led Rehn and Hebard to assign them incorrectly to *notha*, in which species a constant deflection of the median portion of the plate apparently occurs.

[120] The usual variation in number of apparent cercal joints occurs in the species; one male before us has but nine distinct cercal joints on each side.

elongate, hollow ventrad, with lateral margins roundly expanding, then narrowing and at the rounded apex again moderately expanding; mesad and adjacent is situated a very slender, elongate, aciculate process which (sometimes) is weakly curved at its apex. Subgenital plate produced, with proximal portion weakly convex and distal portion deplanate-ascendent,[121] lateral margins weakly convex and weakly convergent, rounding distad into the weakly oblique, nearly straight distal margin, the dextral angle thus formed being slightly the more produced. On the ventral surface of this plate, at these disto-lateral angles, are situated, in small sockets, simple, slender styles, deflexed so that they lie on the ventral surface of the plate, in length equalling half (or frequently more than half) the distance between their bases.[122] Exposed portion of eighth dorsal abdominal segment, which is folded laterad over the base of the subgenital plate, short, slightly longer than exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Topotype. Ehrenberg, Arizona.) Size small, not as compact as in *bolliana*, but with pronotal proportions similar. Head larger and more convex than in male. Interocular space considerably wider than that between antennal sockets, minute ocellar spots present. Maxillary palpi short and stout. Tegmina widely separated, form much as in *bolliana*, reaching very slightly beyond caudal margin of mesonotum, veins appreciable, surface weakly convex to marginal field, which is weakly concave with costal margin cingulate. Wings absent. Supra-anal plate with lateral margins weakly convex and nearly transverse proximad, thence weakly concave and strongly convergent to rather sharply rounded apex. Cerci very short, much more compressed than in male, fusiform, with dorsal surface weakly convex. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Oregon	(2)	12–13.6	3–3.6	4–4.6	14–15.8	4.3–5
Mount Shasta, California	(2)	14–14.3	3.3–3.4	4.1–4.3	15.2–17	4.4–5.3
Sonoma County, California	(7)	13.5–14.8	3.3–3.7	4–5	14.8–16.3	4.6–5
Fresno, California	(2)	12.2–13.8	3.3–3.3	— –4.2	13.6–13.8	4.2–4.2
Lower California, Mexico		12.7	2.8	3.8	13.7	4.3

[121] Rarely the distal margin, at the bases of the styles, is narrowly curved downward.

[122] In the males of the present species, the margins of the subgenital plate are often subchitinous and show various degrees of individual irregularity, as do the styles both in actual length and position.

♀		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Oregon		12	3.8	4.9	2.1[123]	1.9
Bair's Ranch, California		10.2	3.3	4.6[124]	1.9	1.7
Mount Shasta, California	(3)	13.2–13.3	3.8–3.9	4.9–5.7	2.2–2.4	2–2.2
Cahon Pass, California.		11.1	3.1	4.3	1.9	1.8
Ehrenberg, Arizona, *topotype*		8.8	2.8	3.8	1.4	1.6

The type and topotype were taken in a region of extreme aridity which probably explains their small size and coloration, which latter is paler than in females from the Pacific coast. Rather decided individual variation in size is, however, further shown by the series before us.

Coloration.—♂. (Intensive. Two, Mount Shasta, and one, Sonoma County, California.) General coloration of head, pronotum, abdomen, limbs and tegmina shining prout's brown, the tegmina translucent, the dorsal surface of the abdomen shading proximad to ochraceous-buff. Ocelli ochraceous-buff. Wings hyaline, all but the proximal portion of the anterior field weakly suffused, the area of the costal veins heavily suffused with prout's brown. In the paler conditions these areas are similarly suffused, but with the paler color of the tegmina. (Intermediates; to different degrees, all of the remaining series except the three recessive examples.) Head, underparts and limbs tawny russet. Ocelli light buff. Pronotum tawny, occasionally slightly paler toward the lateral margins. Tegmina transparent buckthorn brown, marginal field and distal portions paler. Dorsal surface of abdomen ochraceous-tawny. (Recessive. Two, Fresno, and one, Riverdale, California.) General coloration ochraceous-buff suffused with tawny, ventral surface of abdomen mesad and distad shading to tawny. Head russet, except ocelli and clypeus which are ochraceous-buff.

♀. (Topotype. Recessive.) Shining bay in general coloration, becoming slightly darker on dorsal surface of abdomen. Ocellar spots buffy. Limbs auburn. The specimens from Cahon Pass,

[123] The length of the exposed portion of the female tegmen is given.

[124] This specimen is dried alcoholic and shrivelled, this dimension is approximate.

California, are darker, the pronotum, mesonotum, metanotum and tegmina tinged with chestnut. (Intensive. Mt. Shasta, California.) Head, dorsal surface and tegmina shining black with a weak brown tinge, this slightly greater cephalad. Ocellar spots buffy. Underparts shining blackish bay, limbs shining deep bay.

Outside of the records given below, the species is known only from Ormsby County, Nevada, San José, and Los Angeles, California and from a single male from Lower California, taken by G. W. Dunn, in the Hebard Collection ex Bruner. Over this entire region no other species of the genus is known.

Specimens Examined: 48; 27 males, 9 females, 12 immature individuals.

Oregon, (Washburn), 2 ♂, 1 ♀, [Hebard Cln. ex Bruner].

California, 2 ♂, [Hebard Cln.].

Bair's Ranch, Humboldt County, Cal., VI, 9, 1903, (H. S. Barber), 1 ♀, (dried alcoholic), [U. S. N. M.].

Mount Shasta, base of, Cal., V, 1912, VI, 1914, 2 ♂, 3 ♀, [Davis Cln.].

Eldridge, Cal., X, 30, 1915, (J. A. Kusche), 1 nearly adult ♂, 5 medium small immature ♂, 4 medium small immature ♀, [Hebard Cln.].

Sonoma County, Cal., 7 ♂, [Bklyn. Inst.].

Stanford University, Palo Alto, Cal., IV, 8, 1910, (W. M. Mann), 1 juv. ♀, [Hebard Cln.].

Fresno, Cal., VI, 29, 1900, (E. A. Schwarz), 2 ♂,[125] [U. S. N. M.].

Riverdale, Cal., VII, 5, 1898, (A. A. Eaton), 3 ♂,[126] [U. S. N. M. and Hebard Cln.].

Three Rivers, Tulare County, Cal., VII, 28, 1911, (J. C. Bradley; 1 at light), 2 ♂, [Cornell Univ. Cln.].

Fort Crook, Cal., 1 ♂, [M. C. Z.].

Cahon Pass, Cal., VII, 18, 1897, (A. P. Morse), 2 ♀, [Morse Cln.].

Mount Wilson, San Gabriel Mountains, Cal., IX, 15, 1908, (F. Grinnell Jr.), 1 juv. ♂, [A. N. S. P.].

Pasadena, Cal., (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

San Gabriel, Cal., VI, 1892, (C. E. Hutchinson), 1 ♂, [U. S. N. M.].

Claremont, Cal., VI, 8, 1900, 1 ♂, [A. N. S. P.].

Los Angeles County, Cal., (D. W. Coquillett), 2 ♂, [U. S. N. M. and Hebard Cln.].

Verdi, Nevada, VII, 1 ♂, [U. S. N. M.].

Ehrenberg, Arizona, (E. Palmer), 2 ♀, *type* and *topotype* taken with *type*, [M. C. Z.].

[125] Incorrectly recorded by Rehn and Hebard as *notha*.

[126] Incorrectly recorded by Rehn and Hebard as *notha*.

Parcoblatta zebra[127] new species (Plate III, figures 10 to 14.)

1893. *Ischnoptera uhleriana* Saussure and Zehntner, (not of Saussure, 1862), Biol. Cent.-Amer., Orth., i, p. 36. [♀: Georgia; Texas, and New Mexico; (in part).][128]

1893. *Ischnoptera uhleri* Saussure and Zehntner, ibid., pl. III, figs. 21 and 22. (Lapsus calami.[129]) (In part.) [Figures of female described on page 36.]

1910. *Ischnoptera divisa* Rehn and Hebard, (not of Saussure and Zehntner, 1893), Proc. Acad. Nat. Sci. Phila., 1910, p. 430. (In part.) [♀, Rives, Tennessee.]

Males of this species are distinctive in the specialization of the median segment, which is supplied mesad with a broad, heavy tuft of agglutinated hairs, directed cephalad, with segment furnished with a low transverse ridge toward the cephalic margin, which ridge is furnished, cephalad of the heavy hair tuft, with a fringe of hairs directed caudad, these briefly overlapping the hairs of the tuft. In the position of this organ, the species agrees alone with *P. americana*, but decidedly greater specialization than in that species is shown. The tegminal discoidal sectors show scarcely any radiation, all being feebly oblique, nearly longitudinal.

The pale dorsal coloration, with dark transverse bands on the abdomen, readily distinguishes females showing this, the normal, condition from those of any other species of the genus. Saussure and Zehntner's excellent figures in the Biologia represent a female, showing a less intensive coloration, but in other respects in every way typical. Females of less decided coloration might alone be confused with those of *P. divisa*, but, over the area of coincident distribution, females of that species have the head normally decidedly more flattened.

The general appearance of the insect suggests a small and rather pale member of the complex to which we assign *divisa* and *P. pensylvanica*. The male abdominal characters, however, clearly demonstrate that it is a distinctive form, agreeing in a few features with *americana* and *P. notha*, but widely separated from both.

[127] In allusion to the distinctive female coloration.

[128] Both the latter localities may apply to the present insect, though unknown to us from west of central Texas. Both the description and plate give no indication of the locality from which the specimen figured came. See page 114, footnote 175.

[129] Explained in list of plates, p. VII, (1900). The type for this name is selected in the present paper as the figured male, pl. III, fig. 23; *uhleri* consequently falling in the synonymy under *P. fulvescens*.

Type.— ♂; Pulaski, Illinois. June 9, 1907. [Hebard Collection, Type No. 426.]

Description of Type.—Size rather small, form slender. Interocular space narrow, appreciably less than that between the ocelli and approximately two-fifths that between the antennal sockets. Ocelli strongly defined; inter-ocular-ocellar area distinctly flattened and showing a weak concavity, with surface bearing microscopic, rather decided, irregular pits and transverse rugae. Pronotum with greatest width slightly caudad of mesal point, oblique sulci of disk decided. Tegmina and wings normal, fully developed. Median segment as described above. Other dorsal segments unspecialized; sixth with caudal margin transverse; seventh transversely decidedly narrower, with caudal margin very feebly emarginate, nearly transverse; eighth with caudal margin weakly oblique produced laterad, with mesal portion nearly transverse. Supra-anal plate with lateral margins strongly convergent and feebly concave to a point beyond cercal bases, thence weakly convergent and convex to broadly rounded apex, surface weakly convex above styles, remaining proximal portion weakly concave, distal portion concave and strongly declivent, thus forming at the juncture with the proximal portion a distinct, transverse, weakly arcuate ridge. Cerci slender, not decidedly elongate, with lateral margins rather decidedly crenate meso-distad. Genital hook rather short and slender, subequal in diameter throughout, with distal half rather sharply recurved. Subgenital plate weakly convex, except distad toward bases of styles, where it is rather decidedly concave, lateral margins moderately convex convergent in proximal half, thence weakly concave convergent to styles, where the plate is very briefly and roundly produced, between the styles the distal margin is weakly concave, feebly oblique, as the plate at the dextral style is very slightly more produced; styles small, simple, cylindrical processes, situated in sockets on ventral surface of plate, on the very brief rounded disto-lateral projections which are weakly ascendent, the dorsal surface of the plate there showing no elevation, the dextral style slightly the longer, equalling approximately half the distance between the bases of the styles. Exposed folded ventral portion of eighth dorsal abdominal segment in length (normal position) slightly greater than exposed portion of seventh ventral abdominal segment.

From the additional males it is evident that the margins of the disto-dorsal abdominal segments, supra-anal and subgenital plates show some variability in the present species. The distal portion of the supra-anal plate is also variable in degree of declivity. The wings have one to three incomplete and four complete rami of the ulnar vein in the three males before us.

Allotype.— ♀; Havana, Illinois. August 14, 1907. [Hebard Collection.]

Description of Allotype.—Size decidedly larger and more robust than male. Head much more evenly rounded, with ocellar spots clouded and subobsolete. Interocular space much broader than in male, distinctly less than width between antennal

sockets. Pronotum more ample than in male, with point of greatest width near caudal margin, discal sulci obsolete. Tegmina decidedly reduced, less than twice as long as anal field, broadly sub-lanceolate, with apex in discoidal field and rather sharply rounded. Wings decidedly atrophied, falling slightly short of apex of anal field of tegmina, but with fields and veins fully defined. Sixth dorsal abdominal segment with distal margin broadly convex, except in very brief lateral portions where it is weakly concave, extending over brief proximo-mesal portion of supra-anal plate. Supra-anal plate nearly half as long as wide, projecting beyond distal margin of subgenital plate, lateral margins weakly concave and convergent to between bases of cerci, thence nearly straight, convergent to the sharply rounded apex. Cerci decidedly shorter than in male, with lateral margins very feebly crenate meso-distad. Subgenital plate convex, with distal margin broadly convex and somewhat flattened, subtruncate in mesal section.

Two additional females before us have the lateral margins of the supra-anal plate more strongly concave, the apex varying also slightly in form.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Knox County, Indiana	15	3.6	4.7	16.1	5.4
Pulaski, Illinois, *type*	13	3.1	3.9	13.9	4.3
Dallas, Texas	15	3.7	4.6	15.7	5.1
Victoria, Texas	16	3.7	4.7	15.2	4.9
♀					
Knox County, Indiana	11.5	3.8	5.2	7.7	3.8
Havana, Illinois, *allotype*	14.5	3.9	5.1	7.1	3.7
Rives, Tennessee	11.7	3.9	5	7.7	3.7
Lakeview, Mississippi	12.3	3.7	4.8	6.9	3.6

The very small series before us shows very decided size and color variation.

Coloration.— ♂. (*Type.*) Head, including ocelli, cinnamon-buff, with a vertical band of prout's brown from between the ocelli to the mesal portion of the clypeus. Ventral surface of body, including the proximo-lateral portions of the coxae, warm sepia, remaining portions of limbs cinnamon-buff. Ventral surface of abdomen cinnamon-buff; each segment, including subgenital plate, suffused laterad with warm sepia, but leaving the immediate lateral margins pale. Pronotum with disk, between the sulci, sayal brown, remaining portions transparent, tinged with cinnamon-buff. Tegmina transparent buffy brown. Wings hyaline, with veins, area of costal veins and distal portion of anterior field tinged with buffy

brown. Dorsal surface of abdomen sayal brown, with lateral, broken, suffused bands of chestnut brown, leaving narrow lateral margins of cinnamon-buff. Cerci warm sepia. The male from Dallas, Texas, differs in having the discal sulci warm sepia, the intervening space tawny. That from Victoria, Texas, shows an extreme recessive condition with general coloration weak cinnamon-buff, the tegmina with a pearly luster,[130] pronotum with disk cinnamon-buff, the abdomen with lateral dark markings, above and below, represented only by single small dots of verona brown on each segment, the median segment hair-tuft mikado brown.

♀. (*Allotype.*) Head with vertex pale ochraceous-tawny, below this the face is marked with a subquadrate patch of verona brown, remaining portions of face cinnamon-buff, ocelli feebly indicated in that color. Limbs cinnamon-buff. Ventral surface of abdomen with each segment warm sepia, narrowly margined caudad with cinnamon-buff, except the proximal segments, in which the cinnamon-buff covers the entire segment mesad, subgenital plate warm sepia, with a round meso-lateral spot of cinnamon, continued to the lateral margins in cinnamon-buff. Pronotum with broadly suffused, converging lines of verona brown in position of discal sulci, with single dots of the same cephalad, intervening space clouded with sayal brown, remaining portions of pronotum warm buff. Tegmina translucent snuff brown, with marginal fields warm buff. Dorsal surface of abdomen with each segment broadly margined laterad and caudad with warm buff, in remaining portions blackish brown. Supra-anal plate warm buff, suffused with blackish brown proximad. In two other females before us the lines in the position of discal sulci on the pronotum are narrower and weaker, mikado brown. The contrast in the coloration of the dorsal surface of the abdomen is naturally not as decided in specimens of more recessive coloration, while it is also clear that, in drying, the decided natural contrast is often partially lost.

Specimens Examined: 12; 5 males, 4 females, 2 immature males and 1 immature female.

[130] A noticeable feature in recessive males of *P. divisa* and *P. pensylvanica*, not found in the other species of the genus.

Knox County, Indiana, VI, 8 and 9, 1904, (W. S. Blatchley), 1 ♂, 1 ♀, [Blatchley Cln.].

Havana, Illinois, VIII, 14, 1907, (river shore), 1 ♀, *allotype*, [Hebard Cln.].

Pulaski, Ill., VI, 9. 1907, (bluff), 1 ♂, *type*, [Hebard Cln.].

Rives, Tennessee, VII, 27, (H. Barber), 1 ♀[131] [U. S. N. M.].

Lakeview, Mississippi, VII, 16, 1914, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Hattiesburg, Miss., IX, 11, 1915, (Rehn and Hebard; under sign on short-leaf pines), 2 juv. ♂, [Hebard Cln.].

West Monroe, Louisiana, VIII, 21, 1915, (Rehn and Hebard; in decaying cavity of sweet gum), 1 juv. ♀, [Hebard Cln.].

Mansura, Avoyelles Parish, La., VI, 21, 1909, 1 ♂, [U. S. N. M.].

Dallas, Texas, VI, 1, (J. Boll), 1 ♂, [M. C. Z.].

Victoria, Tex., V, 25, (J. D. Mitchell; at light), 1 ♂, [U. S. N. M.].

Parcoblatta notha (Rehn and Hebard) (Plate III, figures 15 to 19.)

1910. *Ischnoptera notha* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 442, figs. 21 and 22. (In part.) [♂, Huachuca Mountains, Arizona; ♀, Palmerlee, Arizona.[132]]

1912. *Ischnoptera notha* Rehn and Hebard, ibid., 1912, p. 103. [Single Type; ♂, Huachuca Mountains, Arizona.]

All previous records of "*Ischnoptera*" from Arizona, except that of the type of *americana* Scudder, from Ehrenberg, properly apply to the present species, which has been confused with *uhleriana* and "*uhleriana fulvescens*."

The species has not been found outside that state, the reference, as the present species, by Rehn and Hebard, of Saussure and Zehntner's figure of a female as *uhleriana*, probably from Texas or New Mexico, being properly referable to *P. zebra*, as the material now before us clearly shows.

Males of this insect are decidedly the most slender of the larger pale forms of the genus; in the character of the specialization of the median and first dorsal abdominal segments they agree with *P. caudelli* and *P. lata*, but have the projections there found distinctly more pronounced, while the supra-anal plate is distinctive,

[131] Incorrectly recorded by Rehn and Hebard as *divisa*.

[132] Confusion in the above paper unquestionably occurred. The references to Caudell's Arizona records of *uhleriana* were correctly placed under *notha*, but the material upon which these were based, as well as one specimen from the Galiuro Range, Arizona, were unfortunately listed by mistake under *uhleriana fulvescens* and considered in giving the distribution of that insect. With the original description are unfortunately listed three males from California, representing the pale recessive color condition of *americana*.

in form showing some homology to that of *P. americana*, but considerably more specialized.

This species and *P. caudelli* are the only ones of the pale forms of the genus which, in the females, have complete tegmina and wings. Those of the present species are much larger and more robust than those of *caudelli*, and have the tegmina and wings decidedly shorter, the former with apices falling distinctly short of the apex of the abdomen. In the females of *caudelli* these organs have retained the full power of flight, in those of the present species sustained flight would be impossible.

Characters of Male.—(*Type*. Huachuca Mountains, Arizona.) Size rather large, form slender. Head much as in *caudelli*, rather evenly rounded, with ocelli well defined, but margins of ocellar areas rounding rather weakly into the inter-ocellar-ocular area, which area is feebly flattened, weakly convex, showing a few microscopic punctae. Interocular space narrower than that between antennal sockets, slightly wider than that between ocelli. Pronotum unusually long for the genus, with greatest width distinctly caudad of mesal point and with cephalic angles distinctly more broadly rounded than caudal angles, oblique sulci of disk subobsolete.[133] Tegmina and wings normal, fully developed; the former and anterior field of the latter proportionately narrower than in the other species of the genus; wings (in the small series) with three to four incomplete and four to five complete rami of the ulnar vein. Median segment supplied mesad with two subtriangular, rounded but decided, elevations, with cephalic face of each furnished with a very heavy tuft of hairs, the surface of the segment is also supplied cephalad of these with a very few scattered hairs. First dorsal abdominal segment similarly specialized in every way, except that the elevations are not as broad and the scattered hairs cephalad are even less numerous. Sixth dorsal abdominal segment with distal margin nearly straight, transverse. Supra-anal plate with lateral margins proximad weakly convex and nearly transverse to between the cerci, there convex-convergent to the rather broadly rounded apex, the small produced portion with margins thus forming an obtuse angle with those of basal portion; proximal portion transverse and narrow, with surface feebly convex above cerci and feebly concave in intervening area, small produced portion strongly deflexed, with surface concave and strongly declivent distad, thus forming, at the juncture with the proximal portion, a well-defined, rounded and weakly convex, transverse ridge. Cerci elongate and slender, with lateral margins crenate distad. Genital hook showing little narrowing at point of recurvature, and with recurved portion stout and of subequal width throughout. Chitinous, aciculate tip of adjacent process more elongate than usual and weakly curved dextrad only toward apex. Subgenital plate moderately convex, except toward bases of styles, where a slight concavity is indicated; lateral margins moderately convex and feebly convergent in proximal half, then mod-

[133] In the series before us rarely moderately pronounced.

erately concave and more strongly convergent in distal half, remaining distal portion between styles nearly straight, transverse. Styles[134] simple, cylindrical and tapering, unusually long for the genus, length of each only slightly less than distance between their bases, situated in sockets on the caudal faces of small rounded knobs at the disto-lateral angles of the dorsal surface of the subgenital plate.

Characters of Female.—(*Allotype.* Palmerlee, Arizona.) Very different from male. Size medium large, form stout. Head large and evenly rounded, with interocular space slightly greater than that between the antennal sockets and ocelli weakly defined by pale spots. Pronotum much larger than in male, broader, with greatest width decidedly caudad of mesal point, discal sulci obsolete. Tegmina and wings with area reduced nearly half; tegmina rounded evenly distad, not reaching the base of the supra-anal plate; wings more abbreviate, with distal margin distinctly truncate, showing two incomplete and two to three complete rami of the ulnar vein. Supra-anal plate decidedly less than half as long as broad, with lateral margins convergent and feebly concave to acute apex. Cerci much as in male, but slightly shorter. Subgenital plate with surface convex and distal margin broadly convex.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Galiuro Range, Arizona	14.5	3.8	4.8	17.8	4.9
Prescott, Arizona	14.6	3.8	4.8	17.8	4.9
Huachuca Mountains, Arizona, *type*	17	3.9	4.9	16.7	4.8
Huachuca Mountains, Arizona	17.5	3.8	4.8	17.3	4.8
Patagonia Mountains, Arizona	18	4.3	5.3	18.6	5.6
♀					
Santa Rita Mountains, Arizona	14.7	4.6	5.9	10.2	4
Palmerlee, Arizona, *allotype*	14	4.4	5.7	9.4	4.1

Coloration.—♂. (*Type.* Normal.) Head, underparts and limbs light ochraceous-buff, ocelli cream color. Pronotum with disk ochraceous-buff, remaining portions transparent light ochraceous-buff. Tegmina transparent ochraceous-buff. Wings clear hyaline and weakly iridescent, with area of costal veins weakly washed with ochraceous-buff proximad and distad and heavily washed with light buff mesad. Dorsal surface of abdomen light ochraceous-buff, with hair tufts ochraceous-tawny and besides suffused distad with this color. No darker specimens are before us. In the palest specimens at hand the darkest portions, disk of pronotum and hair tufts on abdomen, are ochraceous-buff.

[134] The styles having been destroyed in the type, these features are described from a topotype.

♀. General coloration auburn, with a strong chestnut tinge. Coxae and proximal portions of limbs ochraceous-buff, tinged with ochraceous-tawny.

Large immature males are found to agree with the female sex in the large, evenly convex head, with widely separated eyes and ocellar spots, pronotal form and absence of discal sulci and form of supra-anal plate.

The known distribution of the species is covered by the records given below. It will unquestionably be found, probably widely distributed, in adjacent northern Mexico.

Specimens Examined: 15; 7 males, 3 females, 5 immature individuals.

Arizona, 1 ♂, [Hebard Cln.].

Prescott, Ariz., 1 ♂, [A. M. N. H.].

Galiuro Range, Ariz., V, 26, (H. G. Hubbard), 1 ♂,[135] [U. S. N. M.].

Sabino Basin, Santa Catalina Mountains, Ariz., 3750 feet, VII, 11, 1916, (Rehn and Lutz; trapped, molasses jar, under oaks), 1 ♀, [A. M. N. H.].

Sabino Canyon, Santa Catalina Mountains, Ariz., XI, 15, 1915, (J. F. Tucker; under bark of willows), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Kit's Peak Rincon, Baboquivari Mountains, Ariz., about 4050 feet, VIII, 1 to 4, 1916, (Lutz and Rehn), 1 juv., [A. M. N. H.].

Santa Rita Mountains, Ariz., V, 29, 1 ♂, [U. S. N. M.]; VII, (F. H. Snow), 1 ♂,[136] 1 ♀, [U. S. N. M. and Univ. of Kansas Cln.].

Palmerlee, Cochise County, Ariz., (C. Schaeffer), 1 ♀,[137] *allotype*, 1 juv. ♂, [Bklyn. Inst.].

Reef, Cochise County, Ariz., (C. R. Biederman), 1 juv. ♂, [U. S. N. M.].

Huachuca Mountains, Ariz., VIII, 22, 1903, (E. J. Oslar), 1 ♂, *type*,[138] [U. S. N. M.]; 1 ♂ [139] [Bklyn. Inst.].

Patagonia Mountains, Ariz., V, 15, 1903, (E. J. Oslar), 1 ♂,[140] [U. S. N. M.].

Parcoblatta virginica (Brunner) (Plate IV, figures 1 to 5.)

1865. *T[emnopteryx] virginica* Brunner, Nouv. Syst. Blatt., p. 86. [♀, Draper's Valley, Virginia.]

[135] Accidentally recorded by Rehn and Hebard under *uhleriana fulvescens*.

[136] Previous to description incorrectly recorded by Caudell as *uhleriana*. Accidently recorded by Rehn and Hebard under *uhleriana fulvescens*.

[137] Previous to description incorrectly recorded by Rehn as *uhleriana*.

[138] Previous to description incorrectly recorded by Caudell as *uhleriana*.

[139] Accidentally recorded by Rehn and Hebard under *uhleriana fulvescens*.

[140] Previous to description incorrectly recorded by Caudell as *uhleriana*. Accidentally recorded by Rehn and Hebard under *uhleriana fulvescens*.

1865. *I[schnoptera] borealis* Brunner,[141] Nouv. Syst. Blatt., p. 133. [♂, North America.]

The above synonymy is due to the fact that, at that time, the sexes of the species of the present genus in which the females have decidedly reduced tegmina, were supposed to represent distinct species, universally referred to different genera.

Males of this species are distinctive in the modification of the median segment and in the decided truncation of the supra-anal plate. In general appearance they are nearest males of *P. uhleriana;* which sex of these two species, among the medium small and normally pale forms of the genus, has exceptionally broad tegmina.

Proper association of the sexes of *P. uhleriana* and *P. fulvescens*, and the extensive series of those forms, as well as of the present species, now before us, leaves no room for doubt that the female, described by Brunner as *T. virginica*, represents that sex of the species the male of which was described, on a later page of the same work, as *I. borealis*.

As we now know, the female of *uhleriana* is very different from that of the present species.[142] Brunner's description of *virginica* could only be confused with *fulvescens*, but the females of that species average distinctly larger, are decidedly more robust and more frequently show wide differences in coloration. In addition we would state that, in *virginica*, the females normally have the supra-anal plate with lateral margins straight, convergent to the more acute apex, the caudal margin of the sixth dorsal abdominal segment distinctly less convex and the large proximal spines of the cephalic margins of the cephalic femora fewer than in females of *fulvescens*.

The only other species of the genus, the known females of which have subquadrate tegmina,[143] is *P. lata*, an insect agreeing more closely with *fulvescens*, but much larger and more robust; under *fulvescens* full comparisons are made.

[141] A male of this species is also described on page 134, incorrectly as *I. unicolor* (Scudder). It is merely a specimen of recessive coloration, showing individual differences in the rami of the ulnar vein of the wings.

[142] See description under *uhleriana*.

[143] Females of *Symploce lita* Hebard, show a general resemblance to those of the present species, see page 151.

Characters of Male.—(Asheville, North Carolina.) Size medium small for the genus, form moderately slender. Interocular space one-half[144] (to slightly less than) the width between the antennal sockets, (normally) appreciably less than the interocellar width. Ocelli well defined. Area between eyes and ocelli appreciably flattened[145] to a point just above the antennal sockets, with surface microscopically roughened. Maxillary palpi much as in *P. bolliana*. Pronotum with greatest width at mesal point,[146] oblique sulci of disk very decided and connected caudad by a short, transverse impression. Tegmina and wings normal, fully developed; tegmina broad, distinctly broader than pronotum, with point of greatest width meso-distad; wings (in the series) with two[147] to five incomplete and four to six complete rami of the ulnar vein. Median segment with a moderately large mesal area supplied with minute scattered hairs. Other dorsal segments unspecialized, distal margin of sixth segment weakly and broadly convex in large mesal portion. Supra-anal plate transverse, truncate, fully four times as broad as long, weakly declivent distad, free margin weakly and briefly concave at bases of cerci, thence strongly convergent and weakly convex to broadly transverse median portion. Cerci slender, with (normally) ten[148] joints, decreasing evenly in size distad. Genital hook situated sinistrad, a chitinous process recurved at less than a right-angle, not as elongate as in *bolliana* and in consequence normally concealed by the short supra-anal plate, least width at point of recurvature; mesad and adjacent is situated a very slender and much longer, nearly straight, chitinous process with sharp apex directed slightly sinistrad. Subgenital plate roughly subquadrate with disto-lateral angles rounded, the rounding of the dextral angle slightly the broadest, the dextral margin is straight, produced to this angle, the sinistral margin is (normally) rather deeply concave just before the sinistro-distal angle,[149] distal margin nearly straight, sub-oblique transverse; surface of plate weakly convex but rather extensively deplanate meso-distad; at the disto-lateral angles are situated, in sockets on the ventral surface of the plate at the free margin, simple, slender styles, similar in size and form, in length (normally) each equal to about three-fifths the distance between their bases.[150] Exposed portion of eighth dorsal abdominal segment, which is folded over the base of the subgenital plate, decidedly short, slightly shorter than exposed portion of seventh ventral abdominal segment.

[144] This is the usual condition, though in this species frequent individuals show some difference.

[145] Often weakly concave.

[146] Occasional specimens have the greatest pronotal width very slightly caudad of the mesal point.

[147] The type of Brunner's synonymous *borealis* is described as having but a single complete ramus. This is certainly attributable to individual variation.

[148] Specimens with eleven distinct cercal joints are before us.

[149] Slight variation in the free margins of the subgenital plate is frequent. The concavity of the sinistral margin, just before the sinistro-distal angle, is sometimes deep, rarely subobsolete. The distal margin often shows a slight concavity.

[150] Slight variation in these appendages and in the distal diameter of the plate, results in occasional specimens showing styles with length of each one-half to two-thirds the distance between their bases.

Characters of Female.—(Collison Ridge, Bath County, Virginia.) Size rather small, form more slender than in *uhleriana* or *fulvescens*, not as compact as in *bolliana*. Head broader and more evenly convex than in male. Interocular width slightly greater than that between antennal sockets. Minute ocellar spots present. Pronotum convex, without discal sulci, ample, with portion of greatest width near caudal margin, which is truncate, very weakly convex. Tegmina quadrate pads, with sutural margins slightly overlapping, extending slightly beyond caudal margin of median segment, rounding broadly at apex of anal vein and with the more broadly rounded angle at costal margin slightly the more produced, a slight emargination (normally[151]) indicated on the margin of the discoidal field; veins distinct. Wings represented by small atrophied pads, their apices extending slightly beyond the distal margin of the metanotum. Sixth dorsal abdominal segment with distal margin weakly and broadly convex in large mesal portion. Supra-anal plate decidedly more than twice as wide as long, lateral margins straight convergent,[152] from bases of cerci to acute, sharply rounded apex. Cerci shorter than in male, with lateral margins feebly crenate, joints distinct but dorsal surface subdeplanate. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cambridge, Massachusetts	(3)	13–13.9	3.1–3.2	3.7–3.9	15–15.1	4.8–5
West Point, New York	(2)	11.5–13.8	2.7–3.2	3.4–4.1	14.3–16.6	4.6–5.6
Ivy Hill, Pennsylvania	(9)	12.1–14.2	3–3.4	3.7–4.3	14.7–17	4.8–5.2
Washington, District of Columbia	(15)	11.7–13	3.1–3.3	3.8–4.3	13.8–15.7	4.6–4.7
Tappahannock, Virginia	(3)	11.8–12	3.1–3.2	3.8–3.8	14–13.7	4.6–4.1

[151] As in the other species showing this type of tegmina, the proportions show frequent slight individual variation. Sometimes an appreciable elongation, sometimes a distinct narrowing, is found. At the free margin of the discoidal field variation frequently occurs, ranging from no emargination whatsoever, to a decided concavity, which gives the tegmina a strongly truncate form. This latter condition is normal in *fulvescens* from the eastern United States, though occasional specimens from that region show only a slight emargination.

It is evident that, though eastern material of *virginica* and *fulvescens* is normally different in this feature, it can only be used as of secondary importance. Valid characters such as form, pronotal dimensions, production of the sixth dorsal abdominal segment and form of supra-anal plate must be used in separating females of these species. Failure to recognize this has resulted in Rehn and Hebard's incorrectly recording small females of *fulvescens*, unusual in tegminal contour, as *borealis*, a synonym of *virginica*, from Goldsboro, North Carolina and Mena, Arkansas.

[152] Occasional specimens show a very weak concavity of these margins.

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Asheville, North Carolina	(40)	12.7–13.7	2.8–3	3.7–4	14.4–15.8	4.7–4.9
Northern Illinois		14.7	3.4	4.3	16.7	5.7
St. Louis, Missouri		12.8	3	3.7	13.8	4.7
South Bend, Nebraska	(5)	13.8–15.4	3.3–3.6	4.1–4.4	14.3–15.8	4.9–5.2
Arkansas City, Kansas		11.7	2.9	3.6	12.8	4.3
♀						
Wollaston, Massachusetts		10.3	3.7	4.8	4.3	3.3
Ivy Hill, Pennsylvania	(51)	10.9–12.5	3.2–3.7	4.1–4.9	3.8–4.9	2.7–3.3
Washington, District of Columbia	(32)	10.3–11.7	3.3–3.6	4.–4.6	4–4.4	2.8–3.1
Rabun County, Georgia	(2)	10.5–11.4	3.3–3.3	4.2– —	3.3–3.7	2.8–2.9
Opelika, Alabama		10.3	3.2	4.4	3.7	2.8
Vigo County, Indiana	(2)	10.8–11.6	3.2–3.4	4.4–4.7	4–3.8	2.8–3
South Bend, Nebraska	(3)	10.4–11.5	3.6–3.8	4.5–4.7	3.9–4.6	2.8–3.2

Rather decided size differences are shown by the very extensive series before us, these in great part due to individual variation, though over certain regions somewhat different averages are found to occur. No differences of adequate value or constancy are found, however, to warrant the recognition of a geographic race.

The average number of heavy spines on the ventro-cephalic margins of the cephalic femora aid in distinguishing *virginica* from *fulvescens*, and in consequence we have made the following counts from one hundred females[153], from all portions of the series before us.

Number of Spines	2–4	3–3	3–4	4–4	4–5	4–6	5–5
Number of Specimens	3	5	9	64	15	2	2

Of these, 64 % have four spines on each limb, 81 % four or less, while 98 % have four or less on at least one of the limbs. The fifth or sixth distal, heavy spine, when present in this species, is usually much smaller than the others.

Coloration.— ♂. (Normal.) General coloration ochraceous-buff, with disk of pronotum slightly darker. Head tawny, eyes mummy brown, ocelli pale ochraceous-buff, mouth-parts ochraceous-buff.

[153] This sex of these species is alone liable to be confused. In the males the spine count agrees closely with that of the females.

Tegmina transparent, ochraceous-buff, becoming paler distad. Wings hyaline, with area of costal veins and, to a less degree, distal portion of anterior field, washed with ochraceous-buff. Abdomen ochraceous-buff, washed with buckthorn brown or ochraceous-tawny, particularly distad. In rare specimens, showing maximum recessive coloration, the darker portions of the head are weak ochraceous-tawny and the pronotal disk is of the pale general coloration. In the maximum intensive coloration, the dark portions of the head are deep bay and nearly the entire anterior field of the wings are suffused with ochraceous-tawny.

♀. (Normal.) Head shining blackish chestnut brown, minute ocellar spots pale ochraceous-buff, mouthparts and also limbs ochraceous-tawny. Pronotum and tegmina hazel, the latter with marginal field slightly paler. Dorsal surface of abdomen shining dark chestnut brown, the segments washed more and more heavily proximad with hazel. Ventral surface of abdomen tawny. In rare specimens of maximum recessive coloration the head is tawny, the remaining portions of the insect ochraceous-tawny with underparts and limbs slightly paler. In the maximum intensive coloration, occasionally encountered, the head and dorsal surface of abdomen are shining blackish chestnut brown, the pronotum and tegmina shining suffused chestnut, the limbs pale tawny and ventral surface of abdomen chestnut brown. The majority of the specimens before us range from the normal toward the intensive color condition, no geographic significance being found.

The ootheca is small, usually distinctly less than three times as long as deep, and is carried with suture directed dorsad. Its surface is microscopically granulose with vertical divisions weakly indicated. The suture is supplied with minute, rather well spaced, conical knobs, arranged approximately one at the extremity of, and one intermediate between, each of the vertical divisions.

The range of the species is now known to extend northward on the Atlantic coast as far as Norway and Orono, Maine. South of these points it is widely distributed to the coast as far as the latitude of Lillington, North Carolina.[154] Farther southward it is found only in the Piedmont and numerous in the Appalachians to

[154] Males already recorded by Rehn and Hebard, as the synonymous *borealis*, from Fernandina, Florida, do indeed represent the present species, but it appears quite probable that these were wrongly labelled. Those authors' records of females from Goldsboro, North Carolina, and Mena, Arkansas, must be referred to *fulvescens*.

their southern limit, having been secured as far southwestward as Opelika, Alabama. Westward the species is known as far as St. Anthony Park, Minnesota; Lincoln, Nebraska, and Clark County, Kansas; in the Mississippi valley region not being known south of Crawford County, Indiana, and St. Louis, Missouri.

Specimens Examined:[155] 637; 159 males, 475 females, 1 immature male and 2 immature females.

Orono, Maine, VII, 27, 1906, 1 ♀, [Maine State Agr. Exp. Sta.].
Norway, Me., (S. J. Smith), 1 ♂, [M. C. Z.].
Lowell, Massachusetts, VI, 17, 1879, 1 ♂, 1 ♀, [M. C. Z.].
North Wilmington, Mass., VI, 4, 1909, 1 ♀, [Morse Cln.].
Brookline, Mass., (Bond), 1 ♂, [M. C. Z.].
Jamaica Plains, Mass., VIII, 16, 1877, 1 ♀, [M. C. Z.].
Forest Hills, Mass., VIII, 22, 1877, 1 ♀, [M. C. Z.].
Cambridge, Mass., VI, 9 to VII, 9, 1871, 3 ♂, [M. C. Z.].
Wollaston, Mass., 1883, VI, 1 and 8, 1896, 1897, (F. H. Sprague), 3 ♂, 1 ♀, [M. C. Z.].
Milton, Mass., VI, 26, 1878, 1 ♂, [M. C. Z.].
Wellesley, Mass., VII, 16 to 27, 1904, 1914, (A. P. Morse), 4 ♀, [Morse Cln.].
Springfield, Mass., (Emery), 1 ♀, [M. C. Z.].
Hartland, Vermont, VIII, 10, 1912, 1 ♀, [Morse Cln.].
Waterbury, Connecticut, VI, 7, 1880, (W. H. Patton; at light), 1 ♂, [A. N. S. P.].
New Haven, Conn., (B. H. Walden), 1 ♂, 1 ♀, [Hebard Cln.].
Ithaca, New York, VI, 3, 1915, (W. T. Davis; in Coy Glen), 1 ♂, 1 ♀, [Davis Cln.].
Deep Pond, Wading River, Long Island, N. Y., VII, 26, 1914, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln. and Bklyn Inst.].
Yaphank, L. I., N. Y., VI, 9, 1912, (W. T. Davis), 1 ♂; IX, 5, 1911, (W. T. Davis), 1 ♀, [both Davis Cln.].
West Point, N. Y., (Osten Sacken), 1 ♂, [M. C. Z.]; VI, 14 and 16, 1913 and 1914, (W. T. Davis), 3 ♂, 4 ♀, [Davis Cln.].
Pine Island, N. Y., VI, 20, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].
Clove Valley, Staten Island, N. Y., VIII, 15, 1912, (W. T. Davis; at sugar), 4 ♀; VI, 5 and VIII, 1914, (W. T. Davis), 1 ♂, 2 ♀, [all Davis Cln.].
Newfoundland, New Jersey, V, 28, 1910, (W. T. Davis), 1 ♂, [Davis Cln.].
Bear Swamp, Ramapo Hills, N. J., VI, 20, 1910, (C. L. Pollard,) 1 ♀, [Davis Cln.].
Old Bridge, N. J., VI, (W. T. Davis), 1 ♀, [Davis Cln.].
Lakehurst, N. J., VII and VIII, 18, (W. T. Davis), 2 ♀, [Davis Cln.].
Chatsworth, N. J., VIII, 20, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

[155] So general has been the confusion of the names *borealis*, *uhleriana*, *unicolor* and *uhleriana fulvescens*, that it would be impossible to correct the past references for these, without examining the material upon which each was based.

West Creek, N. J., VIII, 26 and 28, 1914, (Rehn; trapped, molasses jar in pine and oak woods), 2 ♀, [A. N. S. P.].

Eagleswood Bog near Stafford's Forge, Ocean County, N. J., VIII, 28, 1914, (Rehn), 1 ♀, [A. N. S. P.].

Cardiff, N. J., VII, 28 to 31, 1914, (Hebard; trapped, molasses jar in pine barrens), 1 ♀, [Hebard Cln.].

Reega, Atlantic County, N. J., VII, 20 to VIII, 20, 1914, (Hebard; trapped, molasses jar in area of pine barrens with heavy, grassy undergrowth), 32 ♀, [Hebard Cln.].

Peermont, N. J., VII, 13, 1907, 1 ♂, [A. N. S. P.].

Swainton, N. J., VII, 28 to VIII, 21, 1914, (Hebard; trapped, molasses jar in forest of few pines, indicating the southernmost extent of pine barrens), 13 ♀, [Hebard Cln.].

Wildwood Junction, N. J., VII, 28 to VIII, 21, 1914, (Hebard; trapped, molasses jar in oak forest), 38 ♀, [Hebard Cln.].

Dias Creek, N. J., VII, 20 to VIII, 8, 1914, (Hebard; trapped, molasses jar in oak woods), 79 ♀, [Hebard Cln.].

Westville, N. J., VI, 6, 1 ♂, [Hebard Cln.].

Clementon, N. J., VII, 2 to 30, 1914, (E. R. Casey; trapped, molasses jar), 21 ♀, [Casey Cln.].

Mount Pocono, Pennsylvania, VI, 9 to 19, 1906, (P. P. Calvert), 1 ♂, [A. N. S. P.].

Philadelphia, Pa., V, 26, 1 ♂; V, 29, 1906, 1 ♀; VI, 1 to 19, 1914, (Hebard; trapped, molasses jar in heavy ravine forest at Wissahickon and Lincoln Drives), 1 ♂, 2 ♀; VI, 10 to 15, 1914, (Hebard; trapped, molasses jar on rocky slope with few deciduous trees in Fairmount Park at Dauphin Street), 1 ♂, 3 ♀; VI, 12 to 30, 1914, (Hebard; trapped molasses jar on knoll with high deciduous trees on Lincoln Drive at Tulpehocken), 19 ♀, [all Hebard Cln.].

Ashbourne, Pa., VI, 30, 1907, (B. Long), 1 ♂, [A. N. S. P.].

Mount Airy, Pa., VI, 10 and 11, (P. Laurent), 2 ♂, 1 ♀, [Hebard Cln.].

Ivy Hill, Mount Airy, Pa., VI, 4, 1914, (Hebard; under bark of decaying chestnut log), 8 ♂, 4 ♀; VI, 8 to 30, 1914, (Hebard; trapped, molasses jar in lofty scattered chestnut forest), 1 ♂, 54 ♀, [all Hebard Cln.].

Upsal, Pa., VI, 14 to VII, 11, 1914, (Hebard; trapped, molasses jar in oak forest on high ground), 19 ♀, [Hebard Cln.].

Chestnut Hill, Pa., VI, 13, 1904, (Hebard; under stones in forest chiefly of chestnut), 3 ♀, 1 with ootheca; VI, 16 to 23, 1914, (Hebard; trapped, molasses jar near Wissahickon in heavy deciduous forest ravine), 2 ♀; X, 23, 1903, (Hebard; in deciduous forest), 1 juv. ♂, 1 juv. ♀, [all Hebard Cln.].

Whitemarsh, Pa., VI, 8 to VII, 17, 1914, (H; trapped, molasses jar in heavy low chestnut and oak forest on high ridge), 4 ♂, 84 ♀, [Hebard Cln.].

Harrisburg, Pa., VI, 13, (at light), 1 ♂, [Pa. State Dept. Zool.].

McConnellsburg, Pa., VI, 4, 1905, (W. Stone), 1 ♀, [A. N. S. P.].

Beatty, Pa., (O. Brugger), 4 ♂, 2 ♀, 1 juv. ♀, [A. N. S. P.].

Chestertown, Maryland, V, 30, 1910, (E. G. Vanatta), 1 ♂, [A. N. S. P.].

Beltsville, Md., VI, 4, 1914, (J. D. Hood), 1 ♂, [U. S. N. M.].

Cabin John, Md., (A. N. Caudell), 1 ♂, [U. S. N. M.].

Glen Echo, Md., VII, 11, 1914, (A. N. Caudell), 1 ♀, with ootheca, [U. S. N. M.].

Washington, District of Columbia, V and VI, 3 ♂, [U. S. N. M. and Hebard Cln.]; VI, 2, 1903, (A. N. Caudell; bred), 6 ♂, [U. S. N. M.]; VI, 1910, (W. T. Davis; trapped), 35 ♀, [Davis Cln.].

Falls Church, Virginia, VI, 23 and 28, 1 ♂, 1 ♀, [U. S. N. M.].

Tappahannock, Va., VI, 9 and 17, 1915, (H. Fox), 2 ♂, [Fox Cln.].

Charlottesville, Va., VII, 14, 1914, (H. Fox), 1 ♂, [Fox Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 5, 1916, (Hebard; under bark of decayed chestnut stump, 1 adult, several juv.), 1 ♀; 2700 feet, VII, 5 to 14, 1916, (Hebard; trapped, molasses jar), 5 ♀, [all Hebard Cln.].

Boykins, Va., (C. W. Johnson), 1 ♂, [A. N. S. P.].

Lake Drummond, Dismal Swamp, Va., VI, 8 to 11, 1905, (H. S. Barber), 1 ♂, [U. S. N. M.].

Cumberland Gap, Kentucky, (G. Dimmock), 1 ♂, [M. C. Z.].

Sulphur Springs, Buncombe County, North Carolina, 2500 feet, V, 6 to VI, 13, 1904 and 1906, (Hebard; at light), 40 ♂, [Hebard Cln. and A. N. S. P.].

Black Mountains, N. C., V, 20 to IX, 15, 1912, (W. Beutenmüller), 14 ♂, [Cornell Univ. Cln.].

Tryon, N. C., (W. F. Fiske), 1 ♂, [Hebard Cln.].

Lillington, Harnet County, N. C., VI, 28, 1904, (C. S. Brimley; under log in wet place in wood), 1 ♀, with ootheca, [Hebard Cln.].

Clayton, Georgia, 2000 to 3700 feet, VI, 1909, (W. T. Davis), 1 ♀, [Davis Cln.].

Rabun County, Ga., VII, 1910, (W. T. Davis; trapped), 3 ♀, [A. N. S. P. and Hebard Cln.].

Fernandina, Florida, 1 ♂, [A. N. S. P.].

Opelika, Alabama, VIII, 2, 1915, (Hebard; under bark of pine stumps with females of *I. uhleriana* and *I. divisa*), 1 ♀, [Hebard Cln.].

Lake County, Indiana, (W. S. Blatchley), 1 ♂, [Blatchley Cln.].

Marion County, Ind., V, 10, 1896 and 1897, (W. S. Blatchley), 1 ♂, 1 ♀, [Hebard Cln. and M. C. Z.]; VI, 4, 1897, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Crawford County, Ind., V, 26 and 27, 1896 and 1904, (W. S. Blatchley), 1 ♂, 1 ♀, [Hebard Cln.]; VI, 27, 1902, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Vigo County, Ind., VI, 18, 1894, (S. S. Hill), 1 ♀, [Hebard Cln.]; 1 ♀, [M. C. Z.]; (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Terre Haute, Ind., VI, 12, 1892, (W. S. Blatchley; at electric light), 1 ♂, [Blatchley Cln.].

Lawrence County, Ind., VII, 16, 1902, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Clarke County, Ind., VII, 22, 1904, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Madison, Wisconsin, VI, 4 to 30, 6 ♂, [Wis. Agr. Exp. Sta. Cln.].

Dodgeville, Wis., VI, 10 and 11, 1914, (at light), 3 ♂, [Wis. Agr. Exp. Sta. Cln.].

Lancaster, Wis., VI, 8, 1914, (at light), 1 ♂, [Wis. Agr. Exp. Sta. Cln.].

Cranmoor, Wis., (C. W. Hooker), 1 ♂, [U. S. N. M.].
Northern Illinois, 1 ♂, [Hebard Cln.].
Rock Island, Ill., (Walsh), 1 ♂, [M. C. Z.].
St. Louis, Missouri, VI, 15, 1904, (W. V. Warner), 1 ♂, [U. S. N. M.].
St. Anthony Park, Minnesota, VI, 4, 1899, 1 ♂, [Minn. Dept. Agr. Cln.].
South Bend, Nebraska, (L. Bruner), 5 ♂, 3 ♀, [Hebard Cln.].
Ashland, Nebr., 1 ♂, [Hebard Cln.].
Lincoln, Nebr., VI, 3 ♂, [Hebard Cln.].
Nebraska City, Nebr., VI, 5 ♂, 1 ♀, [Hebard Cln.].
Osage, Kansas, (Stolley), 1 ♂, [M. C. Z.].
Arkansas City, Ks., (A. N. Caudell), 1 ♂, [U. S. N. M.].

Parcoblatta uhleriana (Saussure) (Plate IV, figures 6 to 12.)

1862. *I[schnoptera] uhleriana* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 169. (April.) [♂, Pennsylvania.[156]]

1862. *P[latamodes] unicolor*[157] Scudder, Bost. Journ. Nat. Hist., vii, p. 417. (November.) [6 ♂, Massachusetts.]

1862. *E[ctobia] lithophila* Scudder, Ibid., p. 418. [juv., Massachusetts.]

1903. *Ischnoptera intricata* Blatchley, Orth. of Indiana, p. 186, fig. 28. (In part.) [♀: Crawford and Steuben Counties, Indiana.[158]]

Coincidence in time resulted in Scudder's synonym *unicolor*,[159] while his synonymous *lithophila* is attributable to the ill-advised description of immature material. Failure to associate the sexes resulted in the description of the female as *intricata*, since which time that sex of the present species has been without exception recorded under that name, or, due to further incorrect association, as the female of *I. johnsoni*.

Males of this species have been generally confused with those of *P. fulvescens* and *P. virginica* (as the synonymous *I. borealis*). Compared with *fulvescens* close similarity is found in size, general

[156] Taken by the describer.

[157] The records of subsequent authors of *Ischnoptera unicolor*, with two exceptions, apply properly either to males of *virginica*, or to material of that species and males of the present insect, in which case the presence of two distinct species was overlooked. The exceptions are of Floridian material, recorded by Scudder and Blatchley, representing males of *P. fulvescens*.

[158] We here select as single type of *Ischnoptera intricata* Blatchley: figured ♀; Crawford County, Indiana, VII, 2, 1902, (W. S. Blatchley), [Blatchley Cln.]. The male described as this species, with some doubt, by Blatchley, is also before us. It is a specimen of *Ischnoptera deropeltiformis* Brunner, which, killed when recently matured, had not attained its full coloration.

[159] Scudder has given twice the correct length measurements in his description.

coloration, specialization of median segment and form of supra-anal and subgenital plates. In *uhleriana*, however, the head is normally more flattened between the eyes and ocelli and darkened medio-longitudinally; the pronotum is proportionately shorter, with point of greatest width normally mesad and the curvature of the cephalic and caudal angles more nearly similar, while the discal sulci are more pronounced; the tegmina are distinctly broader; the ridges of the median segment more decided, and the subgenital plate, at the base of the dextral style, not decidedly elevated. The cerci are extremely distinctive in having the inner distal angles of the sixth to ninth joints acutely, though weakly, produced and in consequence differing appreciably from the corresponding outer angles, a feature not found constant in any other known species of the genus.[160]

The female sex is distinctive,[161] particularly in the tegmina, which are lateral, but broadly and roundly subtriangular, while vestigial wings are present. Confusion can consequently occur only with the female of *P. desertae*, which is a more slender insect, with interocular space wider, tegmina decidedly narrower, with sutural margins less convex, mesal production of sixth dorsal abdominal segment distinctly less broadly rounded, and distinctively shaped supra-anal plate.

The highly specialized ootheca of the present species is of an entirely different type from that known for any other species of the genus.

Characters of Male.—(Whitemarsh, Pennsylvania.) Size medium for the genus, form moderately slender. Interocular space two-thirds (to slightly less than[162]) the width between the antennal sockets.[163] Ocelli well defined. Inter-ocular-ocellar area appreciably flattened to a point just above the antennal sockets, with surface microscopically roughened. Maxillary palpi more elongate than in *P.*

[160] A production of the distal cercal joints is found in *pensylvanica*. Though occurring in both sexes of that species, it is found to be individually extremely variable and of no diagnostic importance.

[161] The females referred by Rehn and Hebard in their Revision to *uhleriana*, are here properly referred to *fulvescens*; at that time no differences could be found between the females of these supposed geographic races. The confusion arose from the incorrect placing of the female of *uhleriana* as that sex of *johnsoni* (= *Ischnoptera deropeltiformis*).

[162] The variation in this dimension is similar to that found in *virginica*, see footnote 144.

[163] In the series slightly less than, to slightly more than, the interocellar width.

bolliana, third joint slightly longer than fourth or fifth joints, which latter are (normally) subequal in length. Pronotum with greatest width at mesal point,[164] with angles of cephalic and caudal margins (normally) showing a similar curvature; oblique sulci of disk very decided and as in *virginica*. Tegmina and wings much as in *virginica;* wings (in the series) with two to six incomplete and five to eight complete rami of the ulnar vein. Median segment supplied mesad with two weakly arcuate, moderately raised ridges, which are weakly convergent cephalad, with brief cephalic faces each supplied with a heavy tuft of hairs, the surface of the segment is further supplied with minute scattered hairs cephalad of these ridges. Other dorsal segments unspecialized, distal margin of sixth segment showing very feeble, lateral, broad concavities and a very feeble, broad convexity mesad. Supra-anal plate about twice as broad as long, free margin embracing bases of cerci, very weakly convex about them, thence nearly straight, convergent to broadly rounded apex; surface of plate convex above cerci, evenly deplanate and declivent distad in remaining principal portion. Cerci slender, with (normally) eleven joints, decreasing evenly in size distad, the sixth to ninth joints with inner distal angles acutely but briefly produced.[165] Genital hook situated sinistrad, a chitinous process recurved at decidedly less than a right-angle, moderately elongate, with recurved portion well broadened; mesad and adjacent is situated a very elongate process, with distal chitinous portion aciculate and curved weakly sinistrad. Subgenital plate with surface moderately convex, except toward bases of styles, where it is moderately concave; lateral margins weakly convex and very weakly convergent in proximal half, very weakly concave and more strongly convergent in distal half, the concavity slightly greater, but its extent distinctly less, on the dextral margin, remaining distal portion of free margin nearly transverse, very weakly concave and slightly oblique, due to the slightly greater sinistral production of the plate: simple, slender styles, similar in size and form, situated at the rounded disto-lateral angles of the plate, in sockets on the ventral surface, in length (normally) each equal to about half the distance between their bases. Exposed portion of eighth dorsal abdominal segment, which is folded over the base of the subgenital plate, decidedly short, no longer than exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Whitemarsh, Pennsylvania.) Size medium, form broad. Head broader and more evenly convex than in male. Interocular width slightly greater than that between antennal sockets. Minute ocellar spots present. Pronotum moderately convex, without discal sulci, ample, with point of greatest width near caudal margin, which is truncate, very weakly convex; the lateral margins

[164] Rarely individuals show a condition more nearly as in *fulvescens*, with point of greatest width slightly more caudad; due to a weaker convexity of the caudal margin of the pronotum, or to a slight broadening of the curve of the lateral angles of its cephalic margin.

[165] In occasional specimens the degree of production of these angles shows slight differences. In but one, of the two hundred and twenty-nine males before us, could the cercal structure be confused with the simple type found in *fulvescens*, this character being one of the most useful in separating the males of these two species.

cephalad (normally) feebly more convex than in *virginica*. Tegmina rounded, subtriangular, lateral pads, with sutural margins (normally) separated by slightly over 1 mm.,[166] extending slightly beyond caudal margin of median segment,[167] sutural margins rather strongly convex to rather broadly rounded distal angle, which is situated at the moderately convex costal margin; veins distinct but not prominent. Wings represented by very small atrophied pads, their apices extending (normally) slightly beyond caudal margin of metanotum.[168] Sixth dorsal abdominal segment with distal margin distinctly, but broadly, convex in large mesal portion. Supra-anal plate distinctly more than twice as broad as long, lateral margins weakly concave and convergent from bases of cerci to rather broadly rounded apex. Cerci shorter than in male, with lateral margins nearly entire,[169] with joints distinct and dorsal surface very feebly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum[170]	Length of tegmen[171]	Width of tegmen
Wollaston, Massachusetts	(2)	13.7–13.5	2.9–2.9	4.1–4.3	16.3–16.4	5.6–5.4
Whitemarsh, Pennsylvania	(27)	16–16.5	3.1–3.3	4.3–4.9	16.1–17.7	5.3–5.8
Washington, District of Columbia	(9)	13.7–15.5	3.1–3.2	4.3–4.7	15.7–17	5–6
Raleigh, North Carolina	(7)	15–17	3.3–3.4	4.8–4.9	16.7–17.9	5.8–6.1
Asheville, North Carolina	(68)	15–17	3.1–3.4	4.4–5	17.3–18.7	5.7–6.3
Clayton, Georgia	(2)	15.5–15.7	3.4–3.6	4.8–4.8	18.7–18.8	5.8–5.9
Mossville, Illinois		15	3.4	4.7	17.2	5.7
St. Louis, Missouri	(4)	13.3–16.5	3–3.6	4.3–4.7	16–17.7	5.3–5.9
Iowa City, Iowa	(2)	15.5–15	3.2–3.3	4.3–4.7	16.4–17.4	5.4–5.9

[166] Rare specimens show slightly less separation, while this dimension varies individually to nearly 2 mm. in certain specimens.

[167] The large series of females before us, shows decided variation in the tegminal length. Frequent specimens have the tegmina extending only to the caudal margin of the metanotum, while in rare examples these organs extend nearly to the caudal margin of the first abdominal segment.

[168] In individuals showing variation in tegminal size, a proportionate variation in the wing pads is found.

[169] Normally showing an extremely feeble crenation meso-distad.

[170] The pronotal width is given as accurately as possible under the conditions here found. The pronotum is usually somewhat distorted in trapped material, abnormally buckled up, while in papered material it is sometimes more flattened out than in life.

[171] The length of the exposed portion of the tegmen is given for females.

♀		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Sherborn, Massachusetts	(2)	12–13.3	3.7–4.2	5.3–6	3.5–3.9	2.9–3.3
Whitemarsh, Pennsylvania	(383)	11.7–15	3.4–4.1	4.9–5.9	3.2–6.3[172]	2.7–3.7
Washington, District of Columbia	(123)	11.7–13	3.7–3.9	5–5.4	3–4.6	2.8–3.3
Asheville, North Carolina		—	3.9	5.7	4.2	3.2
Clayton, Georgia		11	3.9	5.3	3.7	2.8
St. Simon's Is., Georgia		12.3	3.8	5.6	3.4	3.2
Opelika, Alabama		9.8	3.5	4.8	3.2	2.5
Crawford Co., Indiana	(2)	11.9–12.7	3.6–3.7	5.7–5.3	3.8–4.2	3.2–3
Mountain Grove, Missouri	(11)	11.5–14	3.8–4.2	5.4–5.9	3.7–4.3	3.1–3.2
Bloomington, Iowa		11	3.8	5.5	4	3.3

The very large series of females before us shows interesting variations in the tegmina. Slight variation in size is frequent, while the margin of the discoidal field is sometimes nearly straight, or often shows varying degrees of weak concavity.

The optimum of the present species is apparently found in the southern Appalachians; little geographic variation, however, is apparent.

The number of heavy spines on the ventro-cephalic margins of the cephalic femora is variable, and of no diagnostic value in the majority of the species of the genus. The following count, for one hundred specimens of each sex of the present species, shows the great instability here found.

Number of Spines	2-5	3-3	3-4	3-6	4-4	4-5	4-6	5-5	5-6	5-7	6-6	6-7	6-8	6-9	1-4
Number of Males	0	2	4	1	9	25	4	26	15	1	7	3	1	1	1
Number of Females	1	3	8	0	9	30	1	30	16	0	1	1	0	0	0

Counts made for other species, but not included in the present paper, show considerable variability in each, but, as in the present species, show a count of from four to six of these spines on each cephalic femur in a large majority of the specimens.

[172] Two specimens, in this series alone, of the nine hundred and seventy-two females before us, show this very unusual tegminal length. The extreme distal production in both is found only in the costal field. The average tegminal length for females of *uhleriana* is 3.5 to 4 mm.

Coloration.—♂. (Normal.) General coloration ochraceous-buff with disk of pronotum and tegmina slightly darker, tinged with ochraceous-tawny. Head tawny, shading laterad to ochraceous-buff at the antennal sockets and genae; eyes blackish brown; ocelli pale ochraceous-buff. Tegmina transparent. Wings hyaline, faintly tinged with ochraceous-tawny, this slightly heavier distad in the anterior field and decidedly heavier, as heavy as on the tegmina, in the costal area. Abdomen ochraceous-buff, washed with ochraceous-tawny distad. In specimens of maximum recessive coloration, the ochraceous-tawny is everywhere more dilute, the vertical cephalic marking, however, never disappearing. In the intensive extreme this marking is tawny above, but mars brown below the ventral margin of the eyes; the tegmina being deep russet, with the exception of the marginal field, which is weak ochraceous-tawny.

♀. (Maximum recessive.) Head, pronotum, mesonotum and metanotum ferruginous, the former slightly paler on the genae, the latter narrowly margined with blackish brown caudad. Tegmina kaiser brown, with marginal field ferruginous. Dorsum of abdomen blackish brown, with numerous segments narrowly bordered proximo-laterad with ferruginous. Eyes blackish brown. Minute ocellar dots cream color. Limbs ochraceous-tawny proximad, deepening to tawny at the tibiae. Ventral surface of abdomen kaiser brown, each segment broadly marked with blackish chestnut laterad. From this condition to the maximum intensive type of coloration every gradation and variation is found, the majority of even the paler specimens having, however, the abdomen solidly blackish brown above and below. Rarely pale specimens, having the pronotum ferruginous, have the tegmina, excepting the marginal field, blackish brown, this color occasionally briefly invading the pronotum latero-caudad. This particular condition is strikingly handsome. (Maximum intensive.) General color shining blackish brown, the trochanters and tarsal joints russet. Minute ocellar dots whitish. Often specimens of intensive coloration have the tegmina, and occasionally the pronotum and limbs, slightly paler, blackish chestnut brown, but a multitude of variations occur. One striking type is above entirely blackish brown, except the marginal fields of the tegmina, which are tawny.

The young of both sexes before us are dark in general coloration, further resembling the adult female in cephalic contour.

The remarkable ootheca is carried with suture laterad. It is similar in form to that of *P. fulvescens*, approximately 3.4 mm. in width, with surface microscopically very finely granulate, and vertical divisions weakly defined and moderately well spaced, as in that species. The suture is furnished with minute, regularly and moderately well-spaced, acute-conical projections, as in *fulvescens*, but along each side runs a deeply inset, oval channel, almost closed above by the thin wall projecting from the base of the suture and the lateral surface of the ootheca (see Pl. IV, figs. 11 and 12). This condition is not found in any other species of the genus, for which the ootheca is known.

It is of interest to note that at Whitemarsh, Pennsylvania, in a low but heavy chestnut, oak and maple forest, where molasses traps showed the species to be present in great numbers, search for several hours at various times, on the ground in leaves and leaf mould, under stones and under the bark of decaying chestnut logs, failed to reveal a single specimen of the insect.

The known northern limits of the species are: the vicinity of Boston, Massachusetts; Saginaw Bay, Michigan, and Iowa City, Iowa. On the immediate Atlantic coast it has been found as far south as Pablo Beach, Florida, but has not been recorded from the Coastal Plain or Piedmont Plateau south of Raleigh, North Carolina. It is distributed to the southernmost limits of the Appalachians, and has been taken as far southwestward of that point as Opelika, Alabama. Its southwestward distribution is imperfectly understood, owing to insufficiency of material, the known limital records being Nashville, Tennessee and Mountain Grove, Missouri.

Specimens Examined: 1245; 238 males, 994 females, 13 immature individuals.

Massachusetts, 1 juv. ♂, 1 small juv., *cotypes* of *Ectobia lithophila* Scudder; 1 ♂, *type* of *Platamodes unicolor* Scudder, [all M. C. Z.].

Wellesley, Mass., VII, 16 to VIII, 1902 to 1914, (A. P. Morse), 1 ♂, 5 ♀, [Morse Cln.].

Sherborn, Mass., (E. J. Smith; light trap), 4 ♂; VIII, 1896 and 1910, 2 ♀, 1 with ootheca, [Morse Cln.].

Milton, Mass., VI, 26, 1878, 1 ♀, [M. C. Z.].

Wollaston, Mass., (F. H. Sprague), 2 ♂, [M. C. Z.].

Sharon, Mass., VIII, 22, 1897, (F. H. Sprague), 1 ♀, [M. C. Z.].

Edgartown, Martha's Vineyard, Mass., VI, 28, 1 ♀, [Bost. Soc. Nat. Hist. Cln.].

Lyme, Connecticut, VII, 3, 1910, (A. B. Champlain), 1 ♀, [Morse Cln.].

New Haven, Conn., VI, 14 and 19, 1910, (B. H. Walden), 2 ♂, 2 ♀, [Morse and Hebard Clns.].

Wading River, Long Island, New York, V, 30, 1914, (W. T. Davis), 1 ♂; VII, 26, 1914, (W. T. Davis; at Deep Pond), 2 ♀, [all Davis Cln.].

West Point, N. Y., (Osten-Sacken), 1 ♂, [M. C. Z.]; VI, 18, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Staten Island, N. Y., V, 22 to VIII, (W. T. Davis), 3 ♂, 5 ♀, [Davis Cln.].

Ramsey, New Jersey, VI, 24, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Lakehurst, N. J., V, 27 to VII, (W. T. Davis), 3 ♂, 1 ♀, [Davis Cln. and Bklyn. Inst.]; VII, 27, 1915, (Rehn; in pine barrens), 1 ♀, [A. N. S. P.].

Eagleswood Bog near Stafford's Forge, N. J., VIII, 26 to 30, 1914, (Rehn; trapped, molasses jar), 2 ♀, 1 juv. ♀, [A. N. S. P.].

West Creek, N. J., VIII, 26 and 30, 1914, (Rehn; trapped, molasses jar in oak and pine woods), 1 ♀, 1 juv. ♂, [A. N. S. P.].

Margate City, N. J., VII, 24 to VIII, 16, 1914, (Hebard; trapped, molasses jars in heavy barrier beach forest), 1 ♂, 58 ♀, [Hebard Cln.].

Mount Calvary at Pleasantville, N. J., VII, 25 to 27, 1914, (Hebard; trapped, molasses jar in scant pine barrens undergrowth), 1 ♀, [Hebard Cln.].

Cardiff, N. J., VII, 25 to VIII, 10, 1914, (Hebard; trapped, molasses jars in typical pine barrens undergrowth), 7 ♀, [Hebard Cln.].

Reega, N. J., VII, 20 to VIII, 10, 1914, (Hebard; trapped, molasses jars in pine barrens, with heavy, grassy undergrowth), 7 ♀, [Hebard Cln.].

Swainton, N. J., VII, 20 to VIII, 21, 1914, (Hebard; trapped, molasses jars on border of pine barrens and on edge of swamp), 35 ♀, 1 very small juv., [Hebard Cln.].

Wildwood Junction, N. J., VII, 28 to VIII, 21, 1914, (Hebard; trapped, molasses jars in heavy deciduous forest), 92 ♀, [Hebard Cln.].

Dias Creek, N. J., VII, 27 to VIII, 8, 1914, (Hebard; trapped, molasses jars in heavy oak woods), 99 ♀, 3 very small juv., [Hebard Cln.].

Clementon, N. J., VII, 2 to 31, 1915, (E. R. Casey; trapped, molasses jars), 20 ♀, [Casey Cln.].

Haddonfield, N. J., II, 1, 1889, 1 ♀, [A. N. S. P.].

Ashbourne, Pennsylvania, VI, 17, 1912, (B. Long), 1 ♂, [A. N. S. P.].

Tulpehocken, Pa., VI, 20 to 22, 1914, (Hebard; trapped, molasses jar), 1 ♂, [Hebard Cln.].

Upsal, Pa., VI, 14 to VII, 11, 1914, (Hebard; trapped, molasses jars in upland oak and chestnut forest), 22 ♀, [Hebard Cln.].

Ivy Hill, Mount Airy, Pa., VI, 8 to 30, 1914, (Hebard; trapped, molasses jars in chestnut forest), 2 ♂, [Hebard Cln.].

Chestnut Hill, Pa., VI, 12 to 15, 1914, (Hebard; trapped, molasses jar in Wissahickon forested ravine), 1 ♂, [Hebard Cln.].

Whitemarsh, Pa., VI, 15 to VII, 11, 1914, (Hebard; trapped, molasses jars on ridge with heavy oak, chestnut and maple forest), 27 ♂, 383 ♀, 1 ootheca, [Hebard Cln.].

Valley Forge, Pa., VII, 2, 1915, (Hebard; in decayed log), 1 ♀, [Hebard Cln.].

Ridley Township, Delaware County, Pa., VI, 4, 1897, 1 ♂, [A. N. S. P.].

Dauphin, Pa., VII, 4, 1 ♀, [Pa. State Dept. Zool. Cln.].

Delaware, 3 ♂, [A. N. S. P.].

Chestertown, Maryland, VIII, 19, 1899, (E. G. Vanatta), 1 ♀, [A. N. S. P.].

Forest Glen, Md., VI, 21, 1914, (Mrs. Heidemann), 1 ♂, [U. S. N. M.].

Silver Springs, Md., 1 ♂, [U. S. N. M.].

Plummer's Island, Md., V, 24 to VIII, 27, 1906 to 1914, (Shannon, Barber, Hood, Fisher), 6 ♂, 12 ♀,[173] [U. S. N. M.].

High Island, Md., VII, 1, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Washington, District of Columbia, VI, 1910, (W. T. Davis), 61 ♂, 122 ♀, 1 juv. ♂ and 1 juv. ♀, [Davis Cln.]; VI, 19, (F. Knab), 1 ♀, [U. S. N. M.]; VII, 12, 1912, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Alexandria County, Virginia, VI, 1914, (W. T. Davis), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀, [Davis Cln.].

Arlington, Va., VII, 9, 1914, (Hebard; at night in forest), 1 ♂, [Hebard Cln.].

Fairfax County, Va., VI, 22, 1914, (W. T. Davis), 1 ♀, [Davis Cln.].

Falls Church, Va., VI, 26, (P. B. Rohwer), 1 ♂; X, 6, 1 ♀, [both U. S. N. M.].

Chain Bridge, Va., VI, 9, 1905, (A. N. Caudell), 1 ♀, [Univ. of Kansas Cln.].

Fredericksburg, Va., VII, 20, 1913, (Rehn and Hebard; under damp leaves on edge of forest), 3 ♀, [Hebard Cln. and A. N. S. P.].

Tappahannock, Va., VI, 8 and 17, 1915 and 1916, (H. Fox), 4 ♂, [Fox and Hebbard Clns.].

Charlottesville, Va., VI, 5 and 15, 1914, (H. Fox), 2 ♂, [Fox Cln.].

Deer Lick Mountain, Bath County, Va., 2800 feet, VII, 10, 1916, (Hebard; under bark of decayed chestnut log), 1 ootheca, [Hebard Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 8 to 14, 1916, (Hebard; trapped, molasses jar), 5 ♀; 3000 feet, VII, 14, 1916, (Hebard; in decaying chestnut log with *Cryptocercus punctulatus*), 1 ♀, [all Hebard Cln.].

Raleigh, North Carolina, VI, 1 to 13, 1904, (C. S. Brimley; attracted to light and under bark), 7 ♂, [Hebard Cln.].

Black Mountains, N. C., V, 20 to VII, 15, 1912, (W. Beutenmüller), 10 ♂, [Cornell Univ. Cln.].

Sulphur Springs, Buncombe County, N. C., V, 8 to VI, 13, 1904 to 1906, (Hebard; males attracted to light, female in dead leaves in forest), 68 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Rabun County, Georgia, VII, 1910, (W. T. Davis), 1 ♀, [Hebard Cln.].

[173] One of these males, taken by Barber, was captured while fluttering about one of these females. Females were taken on both dates given above; it would appear that this sex outlives the males by a considerable period, a feature also indicated by the dates of material of other species of the genus here studied.

Clayton, Ga., 2000 to 3700 feet, VI and VII, 1909 and 1910, (W. T. Davis), 2 ♂, 1 ♀, [Davis Cln. and A. N. S. P.].

St. Simon's Island, Ga., VIII, 30, 1911, (Rehn and Hebard; dry leaves under live oaks), 1 ♀, [Hebard Cln.].

Pablo Beach, Florida, VIII, 11, 1905, (Rehn and Hebard; under palmetto root), 1 ♀, [Hebard Cln.]

Crawford County, Indiana, VII, 2, 1902, (W. S. Blatchley), 3 ♀, *type* and *paratypes* of *I. intricata* Blatchley, [Blatchley Cln. and U. S. N. M.].

Mossville, Illinois, V, 1889, (F. Blake), 1 ♂, [M. C. Z.].

Nashville, Tennessee, 1 ♀, [Hebard Cln.].

Opelika, Alabama, VIII, 2, 1915, (Hebard; under bark of pine stumps with females of *P. virginica* and *P. divisa*), 1 ♀, [Hebard Cln.].

Iowa City, Iowa, IV, 24, 1909 and VI, 12, 1915, (M. P. Somes), 2 ♂, [Somes Cln.].

Bloomsboro, Ia., VII, 1867, 1 ♀, [M. C. Z.].

St. Louis, Missouri, V, 14 to VI, 1904, (W. V. Warner; 1 at light), 4 ♂, [U. S. N. M.].

Mountain Grove, Mo., V, 26 to VI, 28, 1914 and 1916, (M. P. Somes; all but 2 ♂ trapped, molasses jar), 9 ♂, 11 ♀, 1 juv. ♂; VII, 29 to VIII, 14, 1916, (for Somes; trapped, molasses jar), 4 ♀, [all Somes Cln.].

Parcoblatta fulvescens (Saussure and Zehntner) (Plate IV, figures 13 to 16).

1893. *Ischnoptera uhleri* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, pl. III, fig. 23. (Lapsus pro *uhleriana*.)[174]

1893. [*Ischnoptera uhleriana*] [variety] *fulvescens* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 36, pl. III, fig. 23. [♂: Georgia; Texas, and New Mexico (in part).][175]

1893. *Temnopteryx texensis* Saussure and Zehntner, ibid., p. 52, pl. III, fig. 31. [♀; New Mexico and Texas.]

Failure to associate the sexes of this species resulted in the above synonymy. Saussure and Zehntner further incorrectly supposed the female of *P. zebra* to represent that sex of typical *uhleriana*, a species not in the material before them at that time.[176]

[174] Though an evident lapsus calami (as indicated in the same volume by Saussure and Zehntner, in 1900, in their list of plates, p. VII), and as the figures apply to two species, we here fix as type of *uhleri* the male figured, and the name *uhleri* accordingly falls in the synonymy under *fulvescens*, as that same specimen we here designate type of *fulvescens*. See next footnote.

[175] Both the description and the plate give no indication of the exact locality, from which came the male described as *uhleriana* var. *fulvescens*. The material treated as "*uhleriana*" is listed as from Georgia, Texas and New Mexico. Among these specimens, the described and figured female unquestionably represents *P. zebra*.

[176] This species has been frequently confused with *uhleriana*. Since 1910, Rehn and Hebard have, with few exceptions, quoted material of the present species as *uhleriana fulvescens*. The Arizona records of *uhleriana* and *uhleriana fulvescens* all apply to *notha*.

Males of this species agree with those of *P. uhleriana* in the type of specialization of the median segment, the ridges there found, however, being normally less pronounced in the present insect. The males of these species, which show some general similarity, are compared under *uhleriana*. The sharply rounded elevation of the inner surface of the subgenital plate at the base of the dextral style, which occurs in the present insect, is not found in any other species of the genus, but this feature shows occasional individual variation in males from the southeastern United States, and in those before us from Texas is very weakly indicated.

The females could only be confused with those of *P. virginica* and *P. lata*. Females of the former are smaller[177]; of the latter, much larger, more robust, with pronotum more transverse, and truncation of tegmina almost always commencing on the sutural margin distinctly beyond the apex of the anal area.

Characters of Male.—(Thomasville, Georgia.) Size medium for the genus, form moderately slender. Interocular space intermediate in width to that between the ocelli and that separating the antennal sockets, wider than is normal in *uhleriana* and showing (in the series) less variability than in that species. Ocelli well defined. Area between eyes and ocelli (normally) showing a weak flattening, not as decided as in *uhleriana*, with a few minute punctae. Maxillary palpi much as in *uhleriana*, but with third and fifth joints subequal in length, each slightly longer than fourth joint. Pronotum (normally) with greatest width slightly caudad of mesal point, with cephalic angles more broadly rounded than caudal angle,[178] oblique sulci of disk weakly defined. Tegmina and wings normal, fully developed; tegmina proportionately narrower than in *uhleriana;* wings (in the series) with one to four incomplete and four to six complete rami of the ulnar vein. Medium segment supplied mesad with two weakly arcuate, feebly raised ridges, which are convergent cephalad, with brief cephalic faces each supplied with a heavy tuft of hairs, the surface of the segment is also supplied cephalad of these ridges with minute, scattered hairs. Other dorsal segments unspecialized, distal margin of sixth segment as in *uhleriana*. Supra-anal plate much as in *uhleriana*, but with surface feebly convex above cerci, declivent distad, the produced distal portion slightly the more declivent, thus showing a feeble, weakly convex, delimiting ridge between the cerci. Cerci slender, with (normally) eleven joints. Genital hook situated sinistrad, a

[177] Full comparison is made under *virginica*.

[178] Rare specimens have these angles similarly rounded, as is normal in *uhleriana*. Other individuals occasionally have the oblique sulci of the pronotal disk unusually pronounced, as in that species.

chitinous process recurved at decidedly less than a right-angle, moderately elongate, with recurved portion very slender and little wider than at point of recurvature. Dextrad and immediately adjacent is situated a straight, very slender process, with chitinous apex aciculate and curved weakly dextrad. Subgenital plate with surface feebly convex, lateral margins more convex and convergent than in *uhleriana*, to weak concavities before styles, but with general character and also sinistral style as in that species. Dextral style situated in a socket above the caudal margin of the plate, this socket placed on the caudal surface of a sharply rounded, rather elongate, knob-like projection of the dorsal surface on the plate.[179]

Characters of Female.—(Spring Creek, Georgia.) Very similar to *uhleriana* in size, form and shape of head. Interocular width very slightly greater than that between antennal sockets. Very small ocellar spots present. Pronotum moderately convex, without discal sulci, ample, with greatest width near caudal margin, which is truncate, very weakly convex. Tegmina subquadrate, with sutural margins feebly overlapping, truncation at apex of anal vein (normally) showing a weak concavity in the discoidal field, weakly oblique so that the (normally) rather sharply rounded angle at the costal margin is slightly the more produced.[180] Wings much as in *virginica*. Sixth dorsal abdominal segment with distal margin (normally) concave laterad, convex in broad mesal portion.[181] Supra-anal plate, cerci and subgenital plate much as in *uhleriana*.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen[182]	Width of tegmen
Arlington, Virginia....		13.7	3.3	4.7	16.3	4.8
Raleigh, North Carolina.....	(3)	16–15.7	3.6–3.7	4.8–4.9	16–17.5	5–5.3
Southern Pines, North Carolina.....	(9)	16–16.5	3.3–3.9	4.3–5	15.2–18.2	4.9–5.6
Sanford, Florida.....	(6)	12.5–13.5	3.3–3.6	4.7–4.8	14–15.3	4.7–4.8
Fort Lauderdale, Florida		15.7	4	5.2	16.7	5.7
Cocoanut Grove, Florida		14.5	3.7	4.5	14.3	4.6
Gulfport, Mississippi..	(2)	14–14.5	3.6–3.6	4.7–4.8	14.7–15	4.7–4.6
San Antonio, Texas....		15	3.8	5.2	16.4	5

[179] The variation found in this projection is discussed above. Both supra-anal and subgenital plates also show frequent minor irregularities of outline.

[180] Variation occurs to a type in which the caudal margin of the tegmen is broadly and evenly rounded, with angle at costal margin, in consequence, broadly rounded. This condition is rarely found in eastern material, but is the normal type in the Texan females (Pl. IV, fig. 16), a few of these, however, showing a feeble emargination in the discoidal field.

[181] This production varies frequently in degree and is occasionally rounded sub-trigonal.

[182] The length of the exposed portion of the tegmen is given for females.

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Victoria, Texas.....	(2)	13.3–14.6	3.3–3.9	4.7–5.3	14.7–16.2	4.3–5.1
Brownsville, Texas....		14	3.6	4.9	14.4	4.6
♀						
Wading River, New York.....		11	3.8	5.3	3.8	3.6
Cardiff, New Jersey...	(5)	13.5–14	4–4.6	5.5–6.1	4.8–5.2	3.8–4.2
Swainton, New Jersey .	(22)	10.8–13.1	3.1–3.8	4.6–5	3.1–4.3	3–3.4
Arlington, Virginia....	(2)	12.5–12.8	3.7–3.8	5.1–5	4.2–4.3	3.3–3.6
Raleigh, North Carolina.....	(7)	13.4–15	3.8–4.6	5.8–6.6	4.3–4.9	3.7–4.3
Southern Pines, North Carolina.....	(4)	13.5–15	4.2–4.4	5.8–6	4.7–4.8	3.8–3.9
Jacksonville, Florida...		15.5	4.6	6.3	4.9	4.1
Fort Myers, Florida...		15.2	4.9	6.4	5.6	4.7
Homestead, Florida...		13	4.3	6.2	4.7	4.1
Big Pine Key, Florida..		14.5	4.7	6.5	5	4.3
Warrington, Florida...	(3)	11–14.5	3.8–4.6	5.3–5.8	3.8–4.7	3.4–4
Gulfport, Mississippi..		13	4.3	5.7	4.3	3.7
San Antonio, Texas....		14.5	4.7	6.4	4.4	4.2
Brownsville, Texas....	(4)	13.5–13.5	4.4–4.5	5.8–6.2	4.8–4.7	4–4.1

The decided size variation is apparently due rather to local environmental conditions than to true geographic influences. Thus great differences are found between the Reega (which approximates the Swainton material) and Cardiff, New Jersey, series, from localities in the pine barrens separated by but a few miles; the former locality, however, showing little undergrowth, the latter rich in grasses, blackberry vines, sweet-fern, etc. Some geographic differences are found, however, in the contour of the female tegmina and specialization of the male subgenital plate, these not sufficiently pronounced or constant to warrant racial recognition.

Coloration.— ♂. (Normal.) General coloration of head, underparts and limbs ochraceous-buff, ocelli light ochraceous-buff, abdomen suffused with russet distad. Pronotum ochraceous-tawny, slightly paler laterad. Tegmina transparent, rather deep ochraceous-buff. Cerci heavily suffused with prout's brown. Every gradation is found from the recessive extreme, in which the general coloration is slightly paler, with abdomen and cerci not darkened, to the intensive extreme in which the greater portions of the

pronotum and limbs are tawny or approaching cinnamon brown, with abdomen more heavily suffused and cerci solidly blackish brown. Occasionally paler males, particularly those from Florida, have the cerci very dark. Occasional examples, particularly among the more northern specimens, have the vertex and median portion of the face somewhat darkened; a medio-vertical band, however, is never found as conspicuous there as is normal in *uhleriana*.

♀. (Maximum recessive.) Head ochraceous-tawny, becoming clear and paler laterad, limbs clear, pale, ochraceous-tawny, ventral surface of abdomen tawny. Pronotum tawny, fading to ochraceous-tawny laterad. Tegmina transparent tawny, tinged with cinnamon-rufous, with marginal field paler. Dorsal surface of abdomen cinnamon-rufous, the proximal segments broadly suffused meso-distad with reddish brown, this increasing caudad, the distal segments and cerci dark reddish brown. Every gradation to the maximum intensive condition is found, the majority of specimens, however, being nearly intermediate, with the tawny coloration slightly deeper, becoming more sharply ochraceous laterad; tegmina tawny, with marginal field ochraceous-tawny, and abdomen blackish brown, slightly paler meso-ventrad. (Maximum intensive.) Head ochraceous-tawny, much suffused between ocellar spots and clypeal suture with deep chestnut brown. Pronotum blackish brown, becoming rather sharply ochraceous-buff laterad. Tegmina translucent blackish brown, with costal area paler and marginal field ochraceous-buff. Limbs tawny. Abdomen above and below, and cerci, blackish brown. This extreme is very rare, but numerous specimens show different degrees of near approach. It is of interest to note that the pronotum in this sex of the present species apparently is never solidly dark, a frequent condition in females of *uhleriana*. The series from the southeastern United States, the majority taken in the pine woods, show a distinctly more reddish brown general coloration than do the other series.[188]

The ootheca of this species is very similar to that of ***virginica***, but larger, averaging 3.7 mm. in depth, with vertical divisions slightly less widely spaced.

[188] This has been noted in other species of Orthoptera.

Distribution.—The present species is known on the Atlantic Coast from Wading River, Long Island, New York, southward to the Florida Keys, invading the Piedmont southward from Dyke, Virginia, but occurring in the greatest abundance in the sandy regions of Georgia and Florida. It is the only species of the genus found over the southern portion of peninsular Florida. Along the Gulf coast its range is continuous, but limited, as far as the Mississippi valley. In that region we have little data of its occurrence: our scattered records, Dallas County, Iowa; Crawford County, Indiana, and Mena, Arkansas, showing probably a wide distribution. In Texas, its distribution extends from every part of the coast to Zavalla County, its northwestern distribution appearing to be limited by the eastern edge of the Edwards plateau.

Specimens Examined:[184] 288; 68 males, 197 females and 23 immature individuals.

Wading River, Long Island, New York, VII, 26, 1914, (W. T. Davis; at Deep Pond), 1 ♀, [Davis Cln.].

Lakehurst, New Jersey, V, 31 to VII, 28, 1911 and 1912, (W. T. Davis), 3 ♀, [Davis Cln.].

Margate City, N. J., VIII, 1 to 16, 1914, (Hebard; trapped, molasses jars in heavy barrier beach forest), 5 ♀, [Hebard Cln.].

Cardiff, N. J., VII, 28 to VIII, 10, 1914, (Hebard; trapped, molasses jars in typical pine barrens undergrowth), 4 ♀, 1 juv. ♂, 2 very small juv., [Hebard Cln.].

Reega, N. J., VII, 20 to VIII, 20, 1914, (Hebard; trapped, molasses jars in pine barrens with heavy, grassy undergrowth), 35 ♀, [Hebard Cln.].

Swainton, N. J., VII, 20 to VIII, 21, 1914, (Hebard; trapped, molasses jars on border of pine barrens and on edge of swamp). 22 ♀, [Hebard Cln.].

Wildwood Junction, N. J., VIII, 1 to 21, 1914, (Hebard; trapped, molasses jars in heavy deciduous forest), 34 ♀, 2 very small juv., [Hebard Cln.].

Dias Creek, N. J., VII, 27 to 31, 1914, (Hebard; trapped, molasses jars in heavy oak woods), 25 ♀, 1 very small juv., [Hebard Cln.].

Seaford, Delaware, VI, (W. T. Davis), 1 ♀, [Davis Cln.].

Cabin John Run, Maryland, VI, 1911, (W. T. Davis), 1 ♀, [Davis Cln.].

Washington, District of Columbia, VI, 1910, (W. T. Davis; trapped, molasses jar), 1 ♂, 2 ♀, [Davis Cln.].

Chain Bridge, Virginia, V, 23, 1905, (A. N. Caudell; bred adult VI. 3, 1905), 1 ♀, [U. S. N. M.].

Arlington, Va., VII, 9, 1914, (Hebard; at night in forest), 1 ♂, 2 ♀,[185] [Hebard Cln.].

[184] All of the females recorded in 1910 by Rehn and Hebard, in their Revision, as *uhleriana uhleriana* are here correctly referred to *fulvescens*.

[185] Incorrectly recorded by Rehn and Hebard as *uhleriana uhleriana* and *uhleriana fulvescens*.

Falls Church, Va., VII, 1 ♀, [U. S. N. M.].

Dyke, Va., VII, 28, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Tappahannock, Va., VII, 18, 1916, (H. Fox), 1 ♀, [Hebard Cln.].

Raleigh, North Carolina, V, 18 to VII, 2, 1904 and 1905, (C. S. Brimley; bred adult VI, 4 to VII, 2, 1904), 3 ♂, 7 ♀,[186] [Hebard Cln. and U. S. N. M.].

Southern Pines, N. C., VI, 3 to VII, 14, 1915, (A. H. Manee), 9 ♂; VIII, 4 to 17, 1915, (A. H. Manee), 7 ♂, 4 ♀, 1 ootheca, [all Hebard Cln.].

Goldsboro, N. C., VII, 25, 1913, (Rehn and Hebard; under debris in dead short-leaf pine needles), 2 ♀,[187] [Hebard Cln.].

Wilmington, N. C., VIII, 1, (G. P. Englehardt), 1 ♀, [Davis Cln.].

Columbia, South Carolina, VII, 28, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Denmark, S. C., VIII, 15, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

Macon, Georgia, VII, 30 and 31, 1913, (Rehn and Hebard; under dead leaves on edge of oak and short-leaf pine woods), 2 ♀, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Brunswick, Ga., VIII, 30, 1911, (Hebard; under bark of pine log), 1 ♂, [Hebard Cln.].

St. Simon's Island, Ga., VIII, 30, 1911, (Rehn; among dead leaves under live oaks), 1 ♀, [A. N. S. P.].

Billy's Island, Okeefenokee Swamp, Ga., VII, 1912, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Honey Island, Okeefenokee Swamp, Ga., VI, 1, 1912, (J. C. Bradley), 3 ♂, 1 ♀, 2 juv. ♂, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Thomasville, Ga., III, 23 to VII, 28, 1903, (Hebard; for Hebard), 6 ♂,[188] [Hebard Cln. and A. N. S. P.].

Spring Creek, Decatur County, Georgia, VI, 7 to 23, 1911, (J. C. Bradley), 1 ♂, [A. N. S. P.]; VII, 16 to 19, 1912, (J. C. Bradley), 1 ♀, [Hebard Cln.].

Jacksonville, Florida, (T. J. Priddey), 6 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Atlantic Beach, Fla., VIII, 25, 1911, (Rehn and Hebard; under refuse), 1 ♂, 5 ♀, [Hebard Cln. and A. N. S. P.].

Pablo Beach, Fla., IX, 5, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Live Oak, Fla., VIII, 10, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

Warrington, Fla., VIII, 4, 1903, (A. P. Morse), 1 ♂, 3 ♀, [Morse Cln.].

St. Augustine, Fla., (C. W. Johnson), 1 ♀, [A. N. S. P.].

Ormond, Fla., IV, 10, 1899, (W. S. Blatchley), 1 ♀,[189] [Hebard Cln.]; 1 ♂, [M. C. Z.].

Fort Reed, Fla., II to V, (J. H. Comstock), 2 ♂,[190] [Cornell Univ. Cln. and M. C. Z.].

[186] Not only was material from this locality recorded incorrectly by Rehn and Hebard as *uhleriana uhleriana* and *uhleriana fulvescens*, but also male specimens of *caudelli* from there were listed under those supposed geographic races.

[187] Incorrectly recorded by Rehn and Hebard as *I. borealis* (=*P. virginica*).

[188] Incorrectly recorded by Rehn and Hebard in 1905 as *uhleriana*.

[189] Incorrectly recorded by Blatchley as *I. unicolor* (=*P. uhleriana*).

[190] Incorrectly recorded by Scudder as *I. unicolor* (=*P. uhleriana*).

Sanford, Fla., (S. B. Fraser), 6 ♂, [M. C. Z.].

Eustis, Fla., VII, 19, (H. G. Hubbard), 1 ♂, [U. S. N. M.].

Fort Lauderdale, Fla., III, 1, 1916, (Hebard; under sign on *Pinus caraibea*), 1 ♂, [Hebard Cln.].

Miami, Fla., IX, 24, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Cocoanut Grove, Fla., IX, 14, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

Homestead, Fla., VII, 10 to 12, 1912, (Rehn and Hebard; males in spider webs of railway station), 2 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Big Pine Key, Fla., IX, 19 and 20, 1913, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Sugarloaf Key, Fla., III, 1898, (O. F. Cook), 1 juv. ♀, [U. S. N. M.].

Sarasota, Fla., II, 21, 1911, (W. S. Blatchley), 1 ♀, [Blatchley, Cln.]; III, 2, 1911, 1 juv. ♂, [Cornell Univ. Cln.].

Lakeland, Fla., V, 8, 1912, (W. T. Davis), 1 ♀, [A. N. S. P.]; XI, 10, 1911, (W. T. Davis), 3 juv. ♂, 2 small juv. ♂, 1 small juv. ♀; V, 4 and 8, 1911, (W. T. Davis), 2 ♀, [both in Davis, A. N. S. P. and Hebard Clns.].

Punta Gorda, Fla., XI, 13, 1911, (W. T. Davis), 1 juv. ♂, [Hebard Cln.].

Useppa Island, Charlotte Harbor, Fla., V, 17 to 19, 1915, (Hebard), 1 small juv., [Hebard Cln.].

Fort Myers, Fla., III, 30, 1911, (W. T. Davis), 1 ♀,[191] [Davis Cln.].

Wiggins, Mississippi, IV, 18, (F. M. Jones), 1 ♂, [A. N. S. P.].

Ocean Springs, Miss., VI, 1905, (J. H. Comstock), 1 juv. ♂, [Cornell Univ. Cln.].

Gulfport, Miss., VII, 18, 1905, (A. P. Morse), 2 ♂, 1 ♀, [Morse Cln.].

Dallas County, Iowa, VIII, (J. A. Allen), 1 ♀, [M. C. Z.].

Mountain Grove, Missouri, VII, 21, 1916, (for Somes; trapped, molasses jar), 3 ♀, [Somes Cln.].

Mena, Arkansas, VII, 30, 1905, (A. P. Morse), 1 ♀, [Morse Cln.].

Paris, Texas, IV, 7, 1904, (at light), 1 ♂, [U. S. N. M.].

Dallas, Tex., VI, 7, 1907, (W. D. Hunter), 1 juv. ♂, [U. S. N. M.].

Tyler, Tex., VI, 27, 1906, (F. C. Bishopp), 1 ♀, [U. S. N. M.].

Waco, Tex., (Belfrage), 1 ♂, [U. S. N. M.].

Round Mountain, Tex., (F. G. Schaupp), 1 ♂, [A. N. S. P.].

Shovel Mountain, Burnet County, Tex., VII, 7 and 10, 1901, (F. G. Schaupp), 2 ♂, [A. N. S. P.].

Rosenberg, Tex., VII, 25, 1912, (Hebard; night at light), 1 ♂, [Hebard Cln.].

Victoria, Tex., VI, (A. N. Caudell), 2 ♂,[192] [U. S. N. M.].

San Antonio, Tex., VIII, 15 and 16, 1912, (Rehn and Hebard; dead leaves under oaks), 1 ♂, 1 ♀ with ootheca, [Hebard Cln.].

Live Oak County, Tex., IV, 29, 1906, (J. D. Mitchell), 1 ♀, [U. S. N. M.].

Nueces River in Zavalla County, Tex., IV, 27, 1910, (Hunter and Pratt), 1 ♀, [U. S. N. M.].

Brownsville, Tex., IV, 30, 1904, (H. S. Barber), 1 ♀,[193] with ootheca, [U. S. N. M.];

[191] Recorded by Rehn and Hebard incorrectly as *I. couloniana* (meaning *P. lata*).

[192] Incorrectly recorded by Caudell as *uhleriana*.

[193] Incorrectly recorded by Caudell as *uhleriana*.

VII, 31 to VIII, 5, 1912, (Hebard; on ground under rats' nests, *Neoloma* sp.), 3 ♀, with 1 ootheca, [Hebard Cln. and A. N. S. P.].

San Tomas, near Brownsville, Tex., IV, 26, (C. Schaeffer), 1 ♀,[194] [Bklyn. Inst.]; V, 30, 1904, (H. S. Barber), 1 ♂, 1 juv. ♀, [U. S. N. M.].

Parcoblatta caudelli new species (Plate V, figures 1 to 5.)

1910. *Ischnoptera uhleriana fulvescens* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 439. (In part.[195]) [3 ♂, Raleigh, North Carolina.]

1910. *Ischnoptera insolita* Rehn and Hebard, ibid., p. 450. (Females only.[196]) [1 ♀, Tryon, North Carolina; 1 ♀, Crawford County, Indiana.]

1916. *Ischnoptera insolita* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 118. (Female sex described as that species.) [1 ♀, Spartanburg, South Carolina.]

Insufficient material resulted in the failure to recognize males of the present insect as widely distinct from *fulvescens* and the unfortunate description of the sexes of distinct species as *insolita*, the males of which represent *desertae*, the females the present species.

This insect is distinctive among the uniform pale species of the genus in having the females supplied with fully developed tegmina and wings, which, though not as ample as in the males, reach beyond the apex of the abdomen.

The males, among the uniform pale species, agree with *P. lata* and *P. notha* in the type of specialization of the median and first dorsal abdominal segments; the elevations there found are slightly less pronounced than in *lata*, decidedly less pronounced than in *notha*. The size is decidedly smaller than in either of those species, the form distinctly narrower than in *lata* and broader than in *notha*, with supra-anal plate of very different form from that found in the latter species. The general character of the supra-anal and subgenital plates is much as in *lata*, but the styles are decidedly longer, in this respect agreeing more nearly with *P. uhleriana*; the styles are not as elongate as in *notha*. In general appearance nearest similarity is found in *P. fulvescens*.

[194] Recorded, with a question, incorrectly by Caudell as *couloniana*.

[195] These specimens appeared to those authors to represent the intermediate condition between the supposed races *uhleriana uhleriana* and *uhleriana fulvescens*. At that time, the specialization of the dorsal surface of the male abdomen had never been considered.

[196] The male described as *I. insolita* has been selected as single type and, in consequence, the name *insolita* falls in the synonymy under *P. desertae*.

Type.—♂; Raleigh, North Carolina. June 18, 1904. (C. S. Brimley.) [Hebard Collection, Type No. 425.]

Description of Type.—Size medium for the genus, form moderately slender. The cephalic and pronotal features agree throughout with *fulvescens*. Head rather evenly rounded, with ocelli well defined, but margin of ocellar areas rounding rather weakly into the inter-ocular-ocellar area, which is feebly flattened, weakly convex, showing a few microscopic punctae. Interocular space intermediate in width to that separating the ocelli and that between the antennal sockets. Pronotum with greatest width slightly caudad of mesal point, with cephalic angles more broadly rounded than caudal angles and oblique sulci of disk weakly defined. Tegmina and wings normal, fully developed; tegmina, as in *fulvescens*, with greatest width very slightly greater than that of pronotum. Median segment supplied mesad with two small and weak elevations, with cephalic faces of each furnished with a heavy tuft of hairs, the surface of the segment is also supplied cephalad of these with a few minute, scattered hairs. First dorsal abdominal segment similarly specialized in every way, except that the minute scattered hairs are less numerous. Sixth dorsal abdominal segment with distal margin transverse, showing very broad and feeble concavity laterad and similar convexity mesad. Supra-anal plate with lateral margins nearly straight, convergent to bluntly rounded apex, surface of plate feebly convex above cerci, in remaining portion weakly concave and declivent distad. Cerci slender and elongate. Genital hook concealed, adjacent process as found in *fulvescens*. Subgenital plate weakly convex to immediate bases of styles, where it is weakly concave, lateral margins nearly straight and weakly convergent to styles, but the sinistral margin showing a feeble concavity distad, distal margin between the styles nearly straight, transverse; styles small, simple, cylindrical processes, situated in sockets on ventral surface of plate at disto-lateral angles, in length each slightly less than the space intervening between their bases. Exposed folded ventral portion of seventh dorsal abdominal segment in length equal to exposed portion of ninth ventral abdominal segment.

The series of males before us shows the following variation. Size individually variable but with some geographic significance. Interocular space occasionally no wider than width between ocelli. Pronotum with discal sulci sometimes subobsolete. Wings with two to four incomplete and four to five complete rami of the ulnar vein. Supra-anal plate with apex varying from rather sharply to rather broadly rounded and with concave surface rarely showing a feeble, transverse, weakly arcuate ridge, a feature normally rather prominent in *fulvescens*. Subgenital plate with distal concavity of sinistral margin occasionally more pronounced.

Allotype.—♀; Spartanburg, South Carolina. August 6, 1913. (M. Hebard.) [Hebard Collection.]

Description of Allotype.—Size smaller than male. Head more evenly rounded, but with ocellar areas still present, though weakly defined, and ocelli approaching a condition of large ocellar spots. Interocular space broader than in male, nearly as wide as width between the more widely spaced antennal sockets. Pronotum pro-

portionately longer than in male, but with discal sulci similarly weakly defined. Tegmina and wings as in male, but less elongate; extending, however, beyond the apex of the abdomen. Supra-anal plate about half as long as broad, trigonal, with lateral margins concave-convergent and apex rather sharply rounded. Cerci similar to those of male but proportionately shorter. Subgenital plate convex, weakly produced, with distal margin broadly convex.

The female before us from Natchez, Mississippi, differs only in having the pronotum shorter and the concavity of the lateral margins of the subgenital plate weaker.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Washington, District of Columbia	(3)	14.3–14.7	3.3–3.4	4.6–4.7	15.7–15.9	4.9–5
Falls Church, Virginia		12.5	2.9	4.1	13.4	4.3
Tappahannock, Virginia (6 *paratypes*)		13.4–14.6	3.2–3.4	4.3–4.7	13.8–15.4	4.5–4.8
Raleigh, North Carolina, *type*		15.2	3.3	4.6	15.2	4.7
Raleigh, North Carolina (2 *paratypes*)		14.2–15.4	3.3–3.4	4.5–4.7	15.3–16	4.9–5.2
Southern Pines, North Carolina		16	3.4	4.6	15.1	4.7
Rich Mountain, Arkansas		12.9	3.4	4.6	14.8	4.7
Dallas, Texas		13.7	3.4	4.4	13.3	4.3
Waco, Texas	(6)	12.2–13.1	3.1–3.3	3.9–4.4	11.8–13.8	3.9–4.2
♀						
Spartanburg, South Carolina, *allotype*		12.2	3.6	4.1	11.8	3.9
Crawford County, Indiana		12.3	3.2	4.1	11.5	4
Natchez, Mississippi		10.7	3.2	4.1	11.4	3.8

Though individual size variation is evident, it appears that, in the drier portions of the species' distribution in Texas, an average reduction in size occurs.

Coloration.—♂. (*Type.* Normal.) Head light ochraceous-buff; the occiput to between the ventral margins of the ocelli suffused with ochraceous-tawny; a narrow, transverse suffusion of the same color mesad on the face and separated from the marking described by a very narrow line of light ochraceous-buff, which unites the light ochraceous-buff ocelli. Limbs light ochraceous-buff, the

abdomen of the same color, suffused with prout's brown. Pronotum with disk ochraceous-tawny, the lateral margins transparent, light ochraceous-buff. Tegmina transparent buckthorn brown, the marginal fields transparent, light ochraceous-buff. Wings hyaline, very weakly tinted with ochraceous-buff, area of costal veins suffused with ochraceous-buff. Dorsal surface of abdomen and cerci weak ochraceous-tawny. Frequently the suffused cephalic markings are obscure or absent, but in occasional specimens of more intensive coloration these markings, as described, are strongly defined in tawny. In such specimens the cerci are, very rarely, dark brown. In the maximum of recessive coloration the darker markings of the insect are all less decided, the pronotum ochraceous-buff, with disk feebly washed with orange brown.

♀. (All before us.) Almost solidly ochraceous-tawny, the lateral margins of pronotum, marginal fields of tegmina and the limbs paler, the ocelli light ochraceous-buff.

We take great pleasure in dedicating this interesting species to our good friend, Mr. A. N. Caudell, custodian of Orthoptera in the U. S. National Museum.

Specimens Examined: 30; 26 males and 4 females.

Washington, District of Columbia, VI, 18, 1912, (A. N. Caudell), 1 ♂, [U. S. N. M.]; VI, 26, 1911, (W. T. Davis), 2 ♂, [Davis Cln.].

Falls Church, Virginia, I, 7, 1914, (A. N. Caudell; bred adult V, 4, 1914), 1 ♂, [U. S. N. M.]

Charlottesville, Va., VI, 15, 1914, (H. Fox), 2 ♂, [Hebard Cln.].

Tappahannock, Va., VI, 9 to 17, 1915, (H. Fox; 1 at night on shrubbery), 6 ♂, *paratypes*, [Hebard and Fox Clns.].

Raleigh, North Carolina, VI, 16 to VII, 1, 1904, (C. S. Brimley; attracted to light), 3 ♂,[197] *type* and *paratypes*, [Hebard Cln.].

Southern Pines, N. C., VII, 14, 1915, (A. H. Manee), 1 ♂, *paratype*, [Hebard Cln.].

Tryon, N. C., (W. F. Fiske), 1 ♀, [U. S. N. M.].

Spartanburg, South Carolina, VIII, 6, 1913, (Hebard; under sign on tree), 1 ♀,[198] *allotype*, [Hebard Cln.].

Crawford County, Indiana, VI, 30, 1902, (W. S. Blatchley), 1 ♀, *allotype* of *I. insolita* Rehn and Hebard, [Blatchley Cln.].

Rich Mountain, Arkansas, VII, 2, 1905, (A. P. Morse), 1 ♂, [Morse Cln.].

[197] See footnote 195. These specimens were similarly misidentified.

[198] See reference. Previously determined as *I. insolita* by Rehn and Hebard.

Natchez, Mississippi, VI, 7, 1909, (E. S. Tucker), 1 ♀, [U. S. N. M.].

Dallas, Texas, VII, 7, (J. Boll), 1 ♂, [M. C. Z.]; VI, 16, (J. Boll), 1 ♂, [U. S. N. M.].

Waco, Tex., VII, 9 to 22, (Belfrage), 7 ♂, [M. C. Z. and U. S. N. M.].

Parcoblatta lata (Brunner) (Plate V, figures 6 to 10; plate VI, figure 1.)

1865. *I[schnoptera] lata* Brunner, Nouv. Syst. Blatt., p. 135. (Exclusive of synonymy.) [♂, North America ? [199]]

1869. *Ischnoptera hyalina* Scudder, Trans. Am. Ent. Soc., ii, p. 307. [♂, Delaware.]

1893. *Temnopteryx major* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 54. [♀, Tennessee.]

1905. *Ischnoptera inaequalis* Rehn and Hebard, (not of Saussure, 1862), Proc. Acad. Nat. Sci. Phila., 1904, p. 779. (In part.) [♂, Thomasville, Georgia.]

1905. *Ischnoptera major* Rehn and Hebard, ibid., p. 780. [Juv.; Thomasville, Tyty Plantation and Ocklockonee River, Georgia.]

1910. *Ischnoptera couloniana* Rehn and Hebard, (not of Saussure, 1862), Proc. Acad. Nat. Sci. Phila., 1910, p. 433. (Excepting references for *I. couloniana* by Saussure and Saussure and Zehntner.) [Twenty records from Delaware to Texas.]

Scudder, evidently misled by Brunner's[200] incorrect and questioned synonymy under *lata* of *Blatta elongata* Beauvois and *Ischnoptera nortoniana* Saussure, described the male of the present species as *I. hyalina*, the type of which is before us. Failure to associate the sexes resulted in Saussure and Zehntner's synonym, *Temnopteryx major*.

The problem of properly associating these names has been extremely difficult. Rehn and Hebard, in 1910, worked out the above synonymy in full, but unfortunately considered that *I. couloniana* Saussure, represented the present species.[201] Careful comparison of the figure of that species, the measurements and description, with the much larger series of the genus now available,

[199] Brunner's description fits material before us in every detail, and we feel little doubt as to the correctness of his locality. His clearly incorrect synonymy has resulted in the failure of subsequent authors to place properly this name.

[200] The synonymy indicated by Brunner, in his "Nouveau Systeme des Blattaires," was clearly made in haste, and in the majority of cases without careful study of the data at hand or examination of material involved. The valueless character of such synonymic effort is illustrated by his placing *I. couloniana* Saussure under *I. pensylvanica* on page 136, and under *I. lata* on page 413.

[201] But two records by Rehn and Hebard as *couloniana* do not represent the present species. The specimen from Anglesea, New Jersey, recorded in 1916, is a male showing the maximum recessive coloration of *divisa;* the female from Fort Myers, Florida, recorded in 1914, is an exceptionally large example of *fulvescens*.

leaves no room for doubt that *couloniana* must be placed in the synonymy under the older *P. pensylvanica* (De Geer).

Normal representatives of both sexes of the present species agree in many ways with *P. fulvescens*, but are very much larger. In the male, however, the specialization of the proximal dorsal abdominal segments is of the type found in *P. caudelli*, the projections being more pronounced in *lata*. In the female the tegmina are normally roundly truncate distinctly beyond the apex of the anal field, a condition never found in females of *fulvescens*.

This is the largest and most robust of the normally pale species of the genus. The maximum intensive coloration, found in males from the Mississippi valley region, gives such specimens a decided similarity to that sex of *P. pensylvanica;* however, these are easily separated by the very different specialization of the proximal abdominal segments, outline of sixth dorsal abdominal segment and of supra-anal plate, and the less elongate and broader tegmina and wings.

Characters of Male.—(Raleigh, North Carolina.) Size large, form robust. Head rather evenly rounded for this sex, ocelli well-defined, margins of ocellar areas rounding weakly into inter-ocular-ocellar area, which area is feebly flattened. Pronotum ample, with greatest width (normally) mesad,[202] but with lateral margins from this point slightly more convergent cephalad than caudad, oblique sulci of disk weakly defined. Tegmina and wings fully developed, normal; tegmina moderately broad, but with point of greatest width meso-proximad; wings (in the series) with two to four incomplete and five to seven complete rami of the ulnar vein. Median segment supplied mesad with two small and weak ridges, convergent cephalad, with cephalic faces of each supplied with a heavy tuft of hairs, surface of segment well supplied cephalad of these ridges with minute, but rather stout, scattered hairs. First dorsal abdominal segment similarly specialized in every way, except that the ridges are slightly more pronounced and the scattered hairs cephalad are fewer. Sixth dorsal abdominal segment with distal margin nearly straight, transverse; seventh with distal margin weakly angulate-emarginate mesad, with sides of emargination convex; eighth with distal margin showing (normally) a similar, but very slight, emargination. Supra-anal plate with lateral margins convergent and weakly convex from cerci to broadly rounded apex,[203] surface very briefly convex above cerci, feebly and unevenly concave in entire remaining portion, which is strongly

[202] Frequent specimens in the series show this slightly caudad of the mesal point. The margins of the pronotum also often show slight differences in the degree of curvature.

[203] Frequent variation occurs in the form of this plate; often slight irregularities of the margins are found, while the apex varies from broadly blunt (though never as blunt as in *pensylvanica*) to rather sharply rounded.

declivent distad. Cerci elongate and slender, with lateral margins moderately crenate distad. Subgenital plate weakly convex, except at immediate base of sinistral style and more extensively at base of dextral style, where it is weakly concave; free margin roughly convex except before base of sinistral style, where a brief emargination (normally) occurs.[204] Styles small, simple and cylindrical, situated disto-laterad in sockets on the ventral surface of the plate at the free margin, each slightly shorter than half the distance between their bases. Exposed folded ventral portion of seventh dorsal abdominal segment in length equal to exposed portion of ninth ventral abdominal segment.

Characters of Female.—(Raleigh, North Carolina.) Size very large, form very robust. Head larger and more evenly rounded than in male, with interocular space slightly less than that between antennal sockets, large ocellar spots present. Pronotum very much larger than in male, with greatest width at point near caudal margin and discal sulci obsolete. Tegmina represented by broad, quadrato-ovate pads; veins distinct; sutural margins overlapping; distal margin broadly rounded, with its mesal portion (normally) transverse,[205] the truncation commencing distinctly beyond the apex of the anal field.[206] Wings represented by decidedly atrophied pads, with apices acute, fields and veins subobsolete. Sixth dorsal abdominal segment with distal margin briefly concave laterad, broadly and distinctly convex mesad. Supra-anal plate nearly half as long as wide, lateral margins convergent and feebly concave to rather bluntly rounded apex. Subgenital plate strongly convex, with free margin showing a weak concavity proximo-laterad before bases of cerci, thence feebly convex throughout, but with mesal portion showing a broad flattening of this convexity.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen[207]	Width of tegmen
Delaware	—	4.8	6.1	21.8	6.4
Plum Point, Maryland	17.5	4.6	5.7	18.9	5.7
Raleigh, North Carolina (11)	20–21.5	4.8–5.2	5.9–6.4	19.4–22.1	6–6.8
Jacksonville, Florida	19.5	4.5	5.8	19.7	5.9
Crawford County, Indiana	20.5	4.6	5.7	21.8	6.7

[204] This concavity is occasionally subobsolete; rarely it is broader and more extensive, extending over half the sinistral margin.

[205] In some series this margin is evenly and broadly convex, very rarely a faint concavity is indicated on the margin of the discoidal field.

[206] Rare specimens have this truncation commencing immediately at the apex of the anal field. In such specimens the usually much greater size serves to separate them from females of *fulvescens*, to which of the other species they alone bear a general resemblance. It is important to note that *fulvescens* attains its greatest size development in southern peninsular Florida, in which region *lata* apparently does not occur.

[207] The length of the exposed portion of the tegmen is given for females.

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Evergreen, Alabama.		18.2	4.1	5.4	17.8	5.2
St. Louis, Missouri...	(4)	18.5–19	4.7–4.9	6.1–6.7	20.7–21.4	6.2–6.4
Natchez, Mississippi..	(2)	18–20	4.2–4.8	6–6.7	18.4–21.7	5.8–6.8
Tallulah, Louisiana...		18.5	4.8	6.4	18.7	6.3
Baton Rouge, Louisiana.....		19.2	4.8	6.6	19.9	6.3
♀						
Plum Point, Maryland	(2)	19.5–20	5.4–5.8	7.4–7.7	7.1–7.4	5.4–5.2
Raleigh, North Carolina.....	(20)	18.5–22	5.4–6.2	7.1–8.2	6.3–8	4.7–5.7
Ortega, Florida.....	(2)	18–18.5	4.8–5.2	6.8–7.3	6–6.7	4.7–5
Crawford County, Indiana.....	(4)	17–18	4.9–5.4	7.1–7.8	5.9–6.7	4.8–5.3
Evergreen, Alabama..	(11)	15.7–18.5	5–5.8	6.7–7.8	6–6.9	4.8–5.6
St. Louis, Missouri...	(3)	18–19	5.7–5.8	7.8–8.2	6.7–6.9	5.1–4.9
Natchez, Mississippi..		18.8	5.9	7.8	6.8	5.2
Beaumont, Texas....	(2)	17.5–18.5	5.7–6.1	7.6–8.1	7.3–6.4	5.3–5.1

A certain amount of geographic variation is found in this species, both in size and in coloration,[208] but very decided individual variation in both these features also occurs.

Coloration.—♂. (Recessive.) (Normal in eastern material; 4 ♂, St. Louis, Missouri; 1 ♂, Baton Rouge, Louisiana.) Head with occiput tawny, shading to chestnut brown between the eyes and fading to tawny below the ocelli; genae and clypeus ochraceous-buff. Ventral surface of body laterad chestnut brown, shading to hazel mesad on abdomen. Limbs ochraceous-buff. Pronotum with disk clear ochraceous-tawny, with margin narrowly ochraceous-buff cephalad, more broadly laterad, the caudal portions of the lateral margins transparent. Tegmina transparent, weak ochraceous-tawny. Wings hyaline, very feebly tinged with ochraceous-buff, area of costal veins washed with ochraceous-tawny. Dorsal surface of abdomen ochraceous-tawny, becoming chestnut brown distad. Cerci chestnut brown. In the maximum recessive condition the chestnut brown is everywhere dilute and less extensive. (Weak intensive.) (1 ♂, Evergreen, Alabama; 1 ♂, Marianna, Florida.) Head, from between eyes to clypeus, chestnut

[208] Specimens from the Carolinas, from the Piedmont to the coast, average very large. Males appear to show frequent different degrees of intensive coloration in the Mississippi Valley region.

l is the entire ventral surface of the insect, including the l tions of the coxae. Limbs ochraceous-tawny. Pro- n h disk zinc orange mesad, shading to tawny cephalad an estnut brown laterad and caudad, cephalic and lateral ma light ochraceous-buff. Tegmina and wings slightly darker recessive condition. (Maximum intensive.) (2 ♂, Nat- ch ssissippi.) (Pl. V, Fig. 6.) Head with genae and ocelli light ochraceous-buff, remaining portions chestnut brown, as is the ventral surface of the insect, becoming blackish distad on the abdomen. Limbs cinnamon brown. Pronotum with disk solid, deep chestnut brown; margins narrowly cephalad, more broadly laterad, light ochraceous-buff. T ina translucent cinnamon brown. Wings hyaline, tinged w.... cinnamon brown, heavily suffused with this color in area of costal veins and, to a less degree, in distal portion of anterior f ld. Abdomen with dorsal surface chestnut brown, becoming bl ckish distad; cerci blackish brown.

♀. (Recessive.) (Normal in eastern material, rare west of Appalachian Mountains.) Head with occiput kaiser brown, deepening below to carob brown, genae ochraceous-tawny, ocellar spots cream color. Limbs ochraceous-buff, strongly tinged with tawny from femora distad. Ventral surface of abdomen blackish brown, shading to carob brown mesad. Pronotum kaiser brown, sometimes, to different degrees, shading to ochraceous-buff laterad, particularly latero-caudad. Tegmina translucent kaiser brown, with marginal field ochraceous-buff. Dorsal surface of abdomen blackish brown, proximad the segments, in increasing degree, are deep hays russet in broad proximo-mesal portion. In the maximum intensive condition the insect is entirely shining blackish brown, except the marginal fields of the tegmina which are translucent ochraceous-buff, suffused with carob brown. Even the ocellar spots are blackish brown and scarcely discernible. In specimens of decided intensive coloration the margins of the pronotum laterad are not unfrequently ochraceous-buff, the extent of this coloring being individually variable.

Immature individuals of *lata* and *fulvescens* might easily be confused in the earlier stages, in the present species the head is normally decidedly darkened. In *lata*, half grown specimens are

already nearly as large and appreciably broader than normal adults of *fulvescens*. Immature examples of *P. pensylvanica*, which are unusually pale in general coloration, are easily confused in early, as well as late, stages with those of the present species.

The ootheca is carried with suture laterad. It is similar to that of *fulvescens*, except that the microscopic granulations of its surface are somewhat heavier and toward the suture are arranged in irregular longitudinal rows. The ootheca differs from that of *fulvescens* also in being often very long (9.7 mm.; Beaumont, Texas), its normal depth 3.9 mm.

The distribution of the present species extends on the Atlantic coast from Delaware[209] and Glendale, Maryland, to Gulf Hammock, Florida, no material having been secured in Florida south of this point.[210] Westward its distribution is known to extend as far as Beaumont, Texas; thence northward to Jacksonville, Texas; St. Louis, Missouri and Wyandotte, Indiana.

Specimens Examined: 190; 45 males, 95 females and 50 immature individuals.

Delaware, 1 ♂, *type* of *I. hyalina* Scudder, [Amer. Ent. Soc., in A. N. S. P.].

Laurel, Maryland, VII, 15, 1883, 2 ♀, [Hebard Cln.].

Chestertown, Md., VIII, 5, 1901, (E. G. Vanatta), 2 ♀, [A. N. S. P.].

Plum Point, Md., VI, 21, 1914, (J. D. Hood), 1 ♂, 2 ♀, [U. S. N. M.].

Lloyds, Dorchester County, Md., VII, 10, 1907, (H. S. Barber), 1 ♀, [U. S. N. M.].

Washington, District of Columbia, IV, 1904, (A. N. Caudell), 2 juv. ♂; 1 ♂, [U. S. N. M.].

Falls Church, Virginia, (N. Banks), 1 ♂; V, 6, 1903, 1 juv. ♂, 1 juv. ♀; VI, 23, 1 ♀, [all U. S. N. M.].

Ocean View, Va., VIII, 9, 1904, (A. N. Caudell), 1 ♀, [U. S. N. M.].

Raleigh, North Carolina, III, 7, 1905, (S. W. Foster), 1 juv. ♂, [Cornell Univ. Cln.]; VI, 7 to VII, 8, 1904, (C. S. Brimley: bred, VI, 11 to 21; under bark of pine logs), 11 ♂, 20 ♀, [Hebard Cln. and A. N. S. P.].

Goldsboro, N. C., VII, 25, 1913, (Rehn and Hebard; under bark of short-leaf pine stump), 1 ♀, [A. N. S. P.].

Southern Pines, N. C., VI, 2 to VIII, 17, 1915, (A. H. Manee), 5 ♂, 10 ♀, [Hebard Cln.].

Wilmington, N. C., VIII, 1, (G. P. Englehardt), 1 ♀, [Davis Cln.].

Winter Park, N. C., IX, 7, 1911, (Rehn and Hebard), 1 small juv., [Hebard Cln.].

Lake Waccamaw, N. C., IX, 8, 1911, (Rehn and Hebard; in sweet gum logs and stumps), 4 juv. ♂, 3 juv. ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

[209] See footnote 201.

[210] See footnote 201.

Nance, N. C., VI, 12 and 16, 1906, (S. W. Foster), 2 ♂, [Cornell Univ. Cln.].

Charlotte, N. C., VII, 27, 1913, (Rehn and Hebard; under sign on red oak), 1 ♀, [Hebard Cln.].

Tryon, N. C., V, 20, (W. F. Fiske), 1 ♂, [U. S. N. M.].

Sulphur Springs, N. C., VI, 5, 1904, (Hebard), 2 ♂, 1 juv. ♂, [Hebard Cln.].

Florence, South Carolina, IX, 6, 1911, (Rehn and Hebard; under bark of short-leaf pine log), 1 juv. ♂, [Hebard Cln.].

Columbia, S. C., VII, 28, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Spartanburg, S. C., VIII, 6, 1913, (Hebard), 2 ♀, [Hebard Cln. and A. N. S. P.].

Clayton, Georgia, VI, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Thompson's Mills, Ga., (H. A. Allard), 1 ♂, [U. S. N. M.].

Atlanta, Ga., V, 6 to 18, 1899, (J. H. Emerton), 1 ♂, [M. C. Z.]; VIII, 18, 1912, 2 ♀, [A. N. S. P. and Hebard Cln.].

Egypt, Ga., (W. H. Finn), 1 ♀, [U. S. N. M.].

Macon, Ga., VII, 30 and 31, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Thomasville, Ga., IX, 21 to III, 25, 1903 and 1904, (Hebard), 4 juv. ♂, 3 juv. ♀; V, 6, 1903, (for Hebard), 1 ♂, [all Hebard Cln. and A. N. S. P.].

Bainbridge, Ga., 1 ♀, [Hebard Cln.].

Spring Creek, Decatur County, Ga., VII, 16 to 29, 1912, (J. C. Bradley), 1 ♂, 1 ♀, [A. N. S. P. and Hebard Cln.].

Jacksonville, Florida, IV, 19, (P. Laurent), 1 ♂, [Hebard Cln.].

Ortega, Fla., IX, 6, 1913, (W. T. Davis), 2 ♀, [Davis and Hebard Clns.].

Gulf Hammock, Levy County, Fla., III, (P. Laurent), 1 ♂, [A. N. S. P.]

Tallahassee, Fla., VIII, 8, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

River Junction, Fla., VIII, 31, 1915, (Hebard; under bark of pine log), 1 juv. ♂, [Hebard Cln.].

Marianna, Fla., VIII, 7, 1903, (A. P. Morse), 1 ♂, 1 ♀, [Morse Cln.].

De Funiak Springs, Fla., VIII, 5, 1903, (A. P. Morse), 3 ♀, [Morse Cln.].

Montgomery, Alabama, IX, 8, 1915, (Hebard; juv. moderately numerous under bark of dead short-leaf pines), 1 juv. ♀, [Hebard Cln.].

Selma, Ala., IX, 9, 1915, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Greenville, Ala., VIII, 3, 1915, (Hebard; under dead pine bark), 1 ♀, 3 small juv., [Hebard Cln. and A. N. S. P.].

Dothan, Ala., IX, 7, 1915, (Hebard; under bark of long-leaf pine stumps), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Evergreen, Ala., VIII, 4, 1915, (Hebard; majority with many young under bark of pine stump), 1 ♂, 11 ♀, 3 juv. ♂, 2 small juv., [Hebard Cln. and A. N. S. P.].

Flomaton, Ala., VIII, 1, 1903, (A. P. Morse), 4 ♀, [Morse Cln.].

Mobile, Ala., VIII, 26, 1915, (Rehn and Hebard; occasional under signs on long-leaf pines, where *Aglaopteryx gemma* Hebard, was more numerous), 6 ♀, 1 juv. ♂, 1 small juv., [Hebard Cln. and A. N. S. P.].

Wyandotte, Crawford County, Indiana, V, 7, 1902, (W. S. Blatchley), 1 ♂; V, 18, 1902, (W. S. Blatchley), 1 juv. ♀; VI, 27 to VII, 7, 1899 to 1902, (W. S. Blatchley), 5 ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

Posey County, Ind., VI, 6, 1904, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Agricultural College, Mississippi, III, 25 to 31, 1903, (J. H. Comstock), 2 juv. ♀, [Cornell Univ. Cln.].

Jackson, Miss., IX, 12, 1915, (Hebard), 1 juv. ♂, [Hebard Cln.].

Natchez, Miss., V, 20, 1909, (E. S. Tucker; in dead oak), 1 ♀; VI, 7, 1909, (E. S. Tucker; at sugar), 2 ♂, [all U. S. N. M.].

St. Louis, Missouri, VI, 24 to VIII, 16, 1904, (C. L. Heink), 4 ♂, 3 ♀, [Hebard Cln.].

Monteer, Mo., V, 30, 1915, (M. P. Somes), 1 ♀, 1 juv. ♀, [Somes Cln.].

Tallulah, Louisiana, II, 20, 1910, (R. A. Cushman; under bark), 2 ♀; V, 20, 1910, (V. I. Safro), 1 ♂, [all U. S. N. M.].

West Monroe, La., VIII, 21, 1915, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Baton Rouge, La., VI, 1905, (A. W. Morrill), 1 ♂, [U. S. N. M.].

Lake Charles, La., XI, 13, (J. C. Crawford), 4 juv. ♀, [U. S. N. M.].

Jacksonville, Texas, X, 12, 1905, (W. D. Pierce), 1 juv. ♀, [U. S. N. M.].

Beaumont, Tex., VII, 23, 1912, (Hebard; under bark of pine stumps), 2 ♀, 1 juv. ♀, 1 ootheca, [Hebard Cln.].

Hockley, Tex., VI, 16, (F. W. Thouron), 1 ♂, [U. S. N. M.].

Parcoblatta divisa (Saussure and Zehntner) (Plate V, figures 11 to 16.)

1893. *Ischnoptera divisa* Saussure and Zehntner, Biol. Cent.- Amer., Orth., i, p. 40. [♂, Georgia.[111]]

Material of the present species has been recorded by Brimley from Raleigh, North Carolina, as *couloniana*, and as that species (but intending *lata* as now understood) by Rehn and Hebard from Anglesea, New Jersey. These authors also incorrectly included under *divisa* a female, from Rives, Tennessee, here properly assigned to *P. zebra*.

Males of the present species agree alone with those of *P. pensylvanica* in the greatly specialized character of the protuberances of the median segment; in the present species the first dorsal abdominal segment is unspecialized, while in *pensylvanica* a similar specialization there occurs. The males also show the distinct separation of these two species from the others of the genus, in the production of the seventh dorsal abdominal segment, which conceals all but

[111] This species, abundant in Georgia, with almost positive certainty does not occur in northern Mexico, a locality also given by Saussure and Zehntner.

We here fix the type locality for the species as Georgia. The remaining material of the type series is either mislabelled or represents a different species.

lateral portions of the eighth segment; this condition is decided in *pensylvanica*.

hose of the present species, females of *pensylvanica* are u: separated with ease by their larger size, proportionately pronotum, more solid colors, with lateral margins of pro- more strikingly pale, while from east of the Appalachians the are normally decidedly longer. Females of *divisa* from c al Georgia southwestward also usually have the head decid- e more flattened than in *pensylvanica*, but this feature shows e variability, even in that portion of the insect's distribution, and is of less value for material from the Atlantic coast. The interocular width averages slightly less than that between the antennal sockets in *divisa*, slightly more in *pensylvanica*. In spite of these features, due to the decided individual variation found in *divisa* and the very great plasticity in *pensylvanica*, rare females are most difficult to distinguish, as in them great convergence in many features usually of distinct value occurs.

Characters of Male.—(Raleigh, North Carolina.) Size medium large, form moderately robust. Interocular width subequal to that between the ocelli.[212] Ocelli well defined. Inter-ocular-ocellar area flattened, with surface microscopically roughened. Pronotum with greatest width (normally) mesad,[213] but with lateral margins from this point slightly more convergent cephalad than caudad, oblique sulci of disk strongly defined. Tegmina and wings normal, fully developed: tegmina with lateral margins subparallel in mesal two-thirds; wings (in the series) with one to three incomplete and five to seven complete rami of the ulnar vein.[214] Median segment supplied mesad with two decided ridges, which are weakly convergent cephalad, with their cephalic extremities overhanging the cephalic portion of the segment, which is there, and between, rather strongly concave, a low ridge connects the two projections just caudad of the concave area; ventral faces of overhanging extremities of the projections very heavily clothed with short hairs, the narrow ridge of the cephalic margin of the segment furnished mesad with numerous hairs. Other dorsal segments unspecialized: sixth with distal margin transverse; seventh weakly produced, with distal margin broadly convex, thus concealing all but the lateral margins of eighth segment and proximo-mesal portion of supra-anal plate. Supra-anal plate with free margin, between the

[212] In the series slightly less to slightly greater than this width, in all distinctly less than the width between antennal sockets.

[213] Occasionally slightly caudad of this point.

[214] In one specimen the median vein branches once; this due to individual variation, but the only instance of such in the material of the genus before us.

cerci, evenly convex;[215] surface rather broadly convex above the cerci, strongly concave and declivent distad in entire remaining portion. Cerci elongate and slender, with lateral margins moderately crenate distad. Genital hook shorter and broader than in any other species of the genus except *pensylvanica*. Subgenital plate weakly convex, except toward bases of styles, where it is moderately concave; lateral margins moderately convex in proximal portion, then rather strongly concave and convergent to bases of styles; distal margin between styles transverse, weakly concave; styles small, simple, cylindrical processes, situated disto-laterad in sockets on the ventral surface of the plate, immediately at the sharply rounded disto-lateral angles, each slightly less than half the distance between their bases, at the base of the dextral style the dorsal surface of the plate is raised in a brief rounded knob. Exposed folded ventral portion of eighth dorsal abdominal segment in length slightly less than that of exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Albany, Georgia.) Size medium, form moderately broad. Head with face appreciably more deplanate than in this sex of any other species of the genus.[216] Interocular space slightly less than that between antennal sockets,[217] small ocellar spots present.[218] Pronotum deeper than in male, with greatest width near caudal margin and latero-caudal angles much more sharply rounded, sulci of disk obsolete.[219] Tegmina (normally) decidedly reduced, broadly sublanceolate, covering only about half the dorsal surface of the abdomen,[220] approximately twice the length of the anal field, decreasing in breadth distad; apex, in discoidal field, only moderately broadly rounded. Wings (normally) greatly reduced, extending but slightly beyond apex of anal field of tegmina, with fields and remaining portions of veins distinct.[221] Sixth dorsal abdominal segment broadly and feebly concave laterad, broadly but more decidedly convex mesad. Supra-anal plate with lateral margins (normally) nearly straight, convergent, showing a slight concavity

[215] The small series of males at hand show slight but distinct differences in form of the supra-anal plate. The free margin in one shows slight truncation; in another feeble disto-lateral angulations of this margin are suggested, a condition approaching the form normal in *pensylvanica*.

[216] This condition is decided only in the females before us from Albany, Georgia and Opelika, Alabama. Those from more northern localities in the east, can not be separated from females of *pensylvanica* by this feature.

[217] Occasional specimens have these dimensions subequal.

[218] In some females of *divisa* the ocellar spots are very weakly defined. In *pensylvanica* the ocellar spots of the female sex are normally more distinct.

[219] These are weakly indicated in many females at hand.

[220] In the series before us are females with abdomen drawn in, and in consequence completely covered by the tegmina, others have decidedly more than half of the abdomen exposed.

Two females from Opelika, Alabama, show that a much greater development in the organs of flight sometimes occurs. These have the tegmina and wings extending to the apices of the cerci, the reduction found being chiefly limited to the distal portions.

[221] Decided variation in the organs of flight occurs in females of *divisa*. The degree of reduction in tegmina and wings is proportionate. See footnote 220.

just beyond the cercal bases, to the rather sharply rounded apex.[222] Cerci shorter than in male, with lateral margins feebly crenate distad. Subgenital plate convex; distal margin very broadly rounded, weakly truncate.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Anglesea, New Jersey		17.3	4.6	6.2	20.8	6.6
Swarthmore, Pennsylvania		17.8	4.3	5.3	20.7	6.3
Raleigh, North Carolina	(5)	13.8–17.6	3.6–4.1	4.7–5.2	16.6–18.8	5.2–5.7
Tallulah, Louisiana		16.7	4.3	5.6	18.2	5.7
Lafayette, Louisiana		16.5	3.8	4.8	16.4	5.1
♀						
Anglesea, New Jersey		16.2	4.9	5.9	9.8	5.1
Wildwood Junction, New Jersey		14.3	4.2	5.7	7.8	4.3
Petersburg, Virginia	(19)	12.7–16.2	4–4.8	5.3–6.6	7.3–9	4.2–4.9
Raleigh, North Carolina	(3)	15–16.2	4.6–4.7	5.7–5.8	8.4–8.2	4.6–4.7
Southern Pines, North Carolina	(7)	13.8–16.5	3.8–4.8	5.1–6.2	7.2–9.9	4.1–4.9
Augusta, Georgia	(4)	13–13.8	3.7–4.3	4.8–5.3	6.6–7.9	4–4.6
Albany, Georgia		13.1	4	5	7.4	4.1
Opelika, Alabama	(2)	12.7– —	3.8–3.8	4.7–4.8	10.8–10.8	4–4.3

Each series of any size shows great individual size variation. Considerable individual color variation also occurs. The females from Albany, Georgia and Opelika, Alabama, have both head and pronotum more deplanate and are much darker, than any others before us, while those from Opelika show an exceptionally full development of both tegmina and wings. These features appear to be at least in part geographic, but, from the evidence at hand, we do not think that sufficient differences of fixity in the same will be found to warrant the recognition of this condition as a geographic race.

Coloration.—♂. (Recessive.) (1, Anglesea, New Jersey.) Head with occiput cinnamon, thence a broad, vertical band of the same color extends ventrad to mesad on the clypeus, ocelli and genae

[222] The apex of the supra-anal plate varies in the series before us from very sharply, to moderately broadly, rounded. Nothing is found in this plate to assist in separating females of *divisa* and *pensylvanica*.

cinnamon-buff. Underparts and ventral surface of abdomen warm sepia, the latter washed with verona brown. Limbs weak buckthorn brown. Cerci blackish brown. Pronotum pinkish buff, with disk cinnamon, faintly clouded with verona brown cephalo-laterad. Tegmina hyaline, tinged with tawny olive, the marginal and scapular fields very faintly; the humeral trunk proximad blackish brown. (Normal.) Occiput mikado brown, the vertical stripe below this chestnut brown. Body warm sepia with a chestnut tinge, the abdominal segments washed with clay color, the specialized area of median segment reddish brown. Limbs clay color. Cerci blackish brown. Pronotum pinkish buff with disk mesad narrowly sayal brown, shading broadly laterad to warm sepia with a chestnut tinge. Tegmina transparent, washed with tawny olive, the humeral vein in proximal third blackish brown. Wings hyaline, tinged with tawny olive, this most decided in area of costal veins, veins snuff brown. A slightly darker condition is shown by the male from Tallulah, Louisiana.

♀. (Maximum recessive.) (Occasional in eastern series.) Head mikado brown, with a large suffusion of warm sepia between the eyes and antennal sockets. Limbs and underparts sayal brown. Pronotum rich mikado brown, margined cephalad and more broadly laterad with cinnamon-buff. Tegmina transparent mikado brown with marginal field, and scapular field to a less degree, cinnamon-buff. Dorsal surface of abdomen blackish brown, rather broadly margined laterad with pinkish buff. Cerci verona brown. In the Eastern series before us every gradation is found to the following intensive condition.[223] Head (except the very faintly paler occiput), underparts, limbs, disk of pronotum, dorsal surface of abdomen (except the buffy lateral margins) and cerci, blackish brown. Cephalic and lateral margins of pronotum cinnamon. Tegmina translucent verona brown, with marginal field, and scapular field to a less degree, cinnamon-buff. Wings hyaline faintly tinged with brown, veins verona brown, with a suffusion of the same color in the area of the costal veins and distal portion of anterior field.

[223] The pronotum in the intermediates is variously suffused to different degrees with dark brown.

The young of the present species are in general coloration (normal Eastern material, recessive) ochraceous-tawny, mottled with darker brown. One specimen before us from Petersburg, Virginia, is much darker, while those from southwestward (Thomasville, Georgia) are uniform blackish brown, except that (in the majority) the pronotum is very feebly and narrowly margined cephalad and laterad with buffy.

The ootheca of the present species closely resembles that of *P. fulvescens*, but the sides are slightly more convex and the sutural projecting margin heavier and more serrate. The dimensions of those before us from Petersburg, Virginia, are: 7.8 by 3.6; 7.8 by 3.7; 8.2 by 3.7, and 8.6 by 3.6 mm. The ootheca of a large female from Plummer's Island, Maryland, is 8.6 by 3.8 mm.

The material listed below defines the known distribution of the species. It is almost certain that the range of the species is continued to the Gulf coast in northern Florida and along that boundary westward to the limits of the humid regions in Texas.

Specimens Examined: 94; 10 males, 43 females, 41 immature individuals.

Swarthmore, Pennsylvania, VI, 12, 1914, (E. T. Cresson, Jr.), 1 ♂, [A. N. S. P.].

Anglesea, New Jersey, VII, 8, 1 ♀, [Hebard Cln.]; VII, 11, (P. Laurent), 1 ♂,[224] [A. N. S. P.].

Wildwood Junction, N. J., VII, 1 to 8, 1914, (Hebard; trapped, molasses jars in oak forest), 1 ♀, 1 juv. ♀, [Hebard Cln.].

Delaware, 1 ♂, [A. N. S. P.].

Plummer's Island, Maryland, VI, 1912, (H. S. Barber), 1 ♀ with ootheca; VII, 23, 1905, (H. S. Barber), 1 ♀, [both U. S. N. M.].

Petersburg, Virginia, VII, 23, 1913, (Rehn and Hebard; under signs on red oaks and short-leaf pines), 19 ♀, 10 juv. ♂, 1 juv. ♀, 4 oothecae, [Hebard Cln. and A. N. S. P.].

Weldon, North Carolina, VII, 24, 1913, (Rehn and Hebard; scarce under signs on trees), 2 juv. ♂, [Hebard Cln.].

Goldsboro, N. C., VII, 25, 1913, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Raleigh, N. C., V, 22 to VI, 15, 1904 and 1905, (C. S. Brimley: 3 bred VI, 9 to 15; 1 attracted to light), 5 ♂; VII, 6 to VIII, 2, 1905, (C. S. Brimley; sugaring), 3 ♀, [all Hebard Cln., A. N. S. P. and U. S. N. M.].

Charlotte, N. C., VII, 27, 1913, (Rehn and Hebard; under signs on white and red oaks and other deciduous trees), 4 juv. ♂, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

[224] Incorrectly recorded by Rehn and Hebard as *couloniana*.

Southern Pines, N. C., VI, 3, 1915, (A. H. Manee), 2 juv. ♂; VI, 16 to IX, 7, 1915, (A. H. Manee), 7 ♀; XI, 22 to XII, 1, 1915, (A. H. Manee), 2 large juv. ♂, 1 juv. ♀, [all Hebard Cln.].[225]

Augusta, Georgia, VII, 29, 1913, (Rehn and Hebard; under signs on short-leaf pines and sweet gums), 4 ♀, 5 juv. ♂, [Hebard Cln.].

Albany, Ga., VIII, 1, 1913, (Rehn and Hebard; under sign on long-leaf pine), 1 ♀, [Hebard Cln.].

Thomasville, Ga., III, 25 to IV, 9, 1904, (Rehn and Hebard; under signs on oaks), 5 large juv. ♂; XII, 1, 1903, (Hebard; under bark), 1 juv. ♂, [all Hebard Cln.].

Opelika, Alabama, VIII, 2, 1915, (Hebard; under bark of pine stumps), 2 ♀, [Hebard Cln.].

Tallulah, Louisiana, VI, 8, 1910, (V. I. Safro), 1 ♂, [U. S. N. M.].

Lafayette, La., VIII, 9, 1915, (Rehn and Hebard; under sign on oak), 1 ♂, 3 ♀, 4 juv. ♂, [Hebard Cln. and A. N. S. P.].

Parcoblatta pensylvanica (DeGeer) (Plate V, figures 17 to 20; plate VI, figures 2 to 4.)

1773. *Blatta pensylvanica* DeGeer, Mém. l'Hist. Ins., iii, p. 537, pl. 44, fig. 4. [♂, Pennsylvania.]

1862. *B[latta] borealis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 166. [♂, North America.]

1862. *[Ischnoptera] couloniana* Sauss., ibid., p. 169. [♂, North America.]

1862. *I[schnoptera] nortoniana* Sauss., ibid., p. 169. [[♂], North America.]

1862. *Platamodes pennsylvanica* Scudder, Bost. Jour. Nat. Hist., vii, p. 417. (In part.) [5 ♂: Indiana; Maryland.]

1862. *E[ctobia] flavocincta* Scudder, ibid., p. 419. [♀: Massachusetts; western States; Lake Superior.]

1864. *Ischnoptera pennsylvanica* Saussure, Mém. l'Hist. Nat. Mex., iii, p. 84. [♂, Kansas.]

1864. *Ischnoptera translucida* Saussure, ibid., p. 85. [♂, North America.]

1865. *Ph[yllodromia] borealis* Brunner, Nouv. Syst. Blatt., p. 101. [♂, North America.]

1872. *Temnopteryx marginata* Scudder, Final Rept. U. S. Geol. Surv. Nebr., p. 251. [♀, banks of Platte River.]

1893. *Ischnoptera inaequalis* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 36, pl. VI, figs. 14 to 17. [♂, ♀: Texas; North Mexico.]

1894. *Ectobia borealis* Beutenmüller, Bull. Am. Mus. Nat. Hist., vi, p. 261. [♀, New York.]

1894. *Ectobia flavocincta* Blatchley, Proc. Indiana Acad. Nat. Sci., 1892, p. 161. [Marshall, Vigo and Putnam Counties, Indiana.]

[225] The material before us indicates that the majority of males winter in a nearly adult condition, appearing adult very early in the spring. The females probably appear full grown at a decidedly later date, not reaching their greatest abundance until at least the middle of July.

1910. *Ischnoptera pensylvanica inaequalis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 427, figs. 11 and 12. [Western material of intensive coloration.]

This widely distributed species is clearly the most plastic of the genus. The above synonymy has resulted, in part, from failure to recognize as the same species, individuals differing in general appearance and the number of synonymic names has also been augmented by failure to associate the sexes, while in one case immature material was described.

Rehn and Hebard, in 1910, corrected in large part this synonymy, but unfortunately wrongly assigned Saussure's name *couloniana*[226] to the species here properly designated as *P. lata*, and recognized two geographic races in the present species.

A decidedly larger series now before us shows clearly that, although average differences in coloration occur in the western portions of the distribution of *pensylvanica* (an intensive condition there being normal), decided individual variation in size, form, coloration, and, in the female, in degree of reduction in the organs of flight, is everywhere pronounced. Differences in intensity of coloration and, in the female, in degree of tegminal reduction, were given as separating the supposed races, *p. pensylvanica* and *p. inaequalis*. These features the material before us conclusively proves worthless.[227]

[226] Though the original description is very brief, we find an excellent figure given by Saussure without name; Mélang. Orth., i, pl. i, fig. 26, (1863). That author, the following year, gives a full discussion of *couloniana* and refers to this figure of the type of that species, but incorrectly, as fig. 21; Mém. l'Hist. Nat. Mex., iv, p. 83.

In the description, the tegminal width is given as 5 mm. This is decidedly incorrect, as the figure shows, the exact dimensions of the figure being: length of pronotum, 4.7; width of pronotum, 6.3; length of tegmen 24.5; width of tegmen 7.2 mm. That the figure is correct is proven by our series, which show that no North American species, with tegmen 24 mm. or over in length, has the tegminal width under 6 mm. This error was largely responsible for Rehn and Hebard's incorrect association of the name in 1910 and Blatchley's suggestion of its position in 1904.

[227] The western type was said to have the color pattern decidedly contrasted, with discal area of pronotum uniform. Specimens before us from Wildwood Junction, New Jersey; Washington, District of Columbia, and Fredericksburg, Virginia, show a maximum of this condition, while specimens from Dallas County, Iowa, and Osage, Kansas, are strongly recessive and intermediates occur throughout the series. It is true, however, that an intensive coloration is more frequently encountered in western material.

The degree of tegminal reduction, though decided in a greater percentage of western females and in a few from that region showing the maximum, is very considerable in

Males of the present species are distinctive in the specialization of the median and first dorsal abdominal segments. The median segment is developed similarly to that of *P. divisa*, but without a raised ridge connecting the projections caudad. The first abdominal segment is, however, also similarly specialized in every way, except that the cephalic margin, cephalad of the projections, bears fewer hairs.

Females of this insect are readily separated, in large part, from those of *divisa* by the features stated in the discussion under that species. As we have there remarked, however, rare individuals of the present very plastic form show such close similarity to the extremes of *divisa* toward the present type, that, even considering the sum total of usual differences, correct determinations are in such cases extremely difficult.

Characters of Male.—(Philadelphia, Pennsylvania.) Size very large, form moderately broad. Interocular space distinctly less than that between antennal sockets.[228] Ocelli well defined. Inter-ocular-ocellar area flattened,[229] with surface microscopically roughened. Pronotum with greatest width (normally) mesad,[230] but with lateral margins, from this point, slightly more convergent cephalad than caudad; oblique sulci of disk strongly defined. Tegmina and wings fully developed, normal; tegmina with lateral margins subparallel in mesal two-thirds; wings (in the series) with no to four incomplete and six to eight complete rami of the ulnar vein.[231] Median segment supplied mesad with two decided ridges which are weakly convergent cephalad, with their cephalic extremities overhanging the cephalic portion of the segment, which is there and between rather strongly concave; ventral faces of overhanging extremities heavily clothed with short hairs, the narrow ridge of the cephalic margin of the segment mesad furnished with numerous hairs. First dorsal abdominal segment similarly specialized in every way, except that the cephalic margin is supplied with fewer hairs. Sixth dorsal abdominal segment with distal

females from Sunbury and Lake Wesauken, Pennsylvania, and to a less degree in three from the Black Mountains of North Carolina. In the western series, the less reduced tegminal condition, though rare, is sometimes found.

[228] Variable in the series; slightly greater than (more usual), to slightly less than, the interocellar width.

[229] Very often unevenly weakly concave.

[230] Occasionally slightly caudad of this point.

[231] The veins in this species show greater irregularities than in any other of the genus. Frequently the rami of the ulnar vein branch near the distal margin of the wing; while in one specimen this is also true of the median vein, which branches twice in one wing and once in the other. A single specimen has no incomplete rami of the ulnar vein, but numbers have but a single incomplete ramus.

margin transverse; seventh with surface moderately convex and with distal margin convex but truncate mesad, thus concealing (in normal position) all but lateral margins of eighth segment and proximo-mesal portion of supra-anal plate. Supra-anal plate with free margin between the cerci convex, but (normally) showing feeble angulations disto-laterad.[232] Cerci elongate and slender, with disto-lateral angles of proximal joints slightly produced[233] and lateral margins moderately crenate distad. Genital hook very short and broad, with distal half sharply recurved, elongate oval and tapering to acute apex. Subgenital plate much as in *divisa*. Exposed folded ventral portion of eighth dorsal abdominal segment extremely variable in the series, in length (normally) less than that of exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Mount Airy, Philadelphia, Pennsylvania.) Size large, form decidedly robust. Head larger and more evenly rounded than in male, with face slightly more deplanate than in this sex of the species of the genus, except *divisa*.[234] Interocular space (in the series) slightly less than (normal) to slightly greater than that between antennal sockets. Pronotum more ample and decidedly wider than in male, with greatest width near caudal margin and latero-caudal angles much more sharply rounded; sulci of disk subobsolete.[235] Tegmina reduced, covering (normally) more than half the dorsal surface of the abdomen.[236] Sixth dorsal abdominal segment broadly and feebly concave laterad, broadly but more decidedly convex mesad. Supra-anal plate (normally) with lateral margins nearly straight, convergent, showing a slight concavity just beyond bases of cerci, to the rather sharply rounded apex.[237] Cerci shorter than, but otherwise much as, in male.[238] Subgenital plate strongly convex, with distal margin very broadly rounded and feebly irregular.

[232] Even greater variation than in *divisa* is found, and although the condition described above is the more usual in the series before us, it is evident that in large series individuals will be found with this plate ranging from convex-truncate to evenly convex and convex-trigonal.

[233] In the majority of western specimens these angles are decidedly produced, as much as in *uhleriana*. In the present species, however, this is not sufficiently constant to warrant recognition, except as an interesting individual variation having some geographic significance.

[234] See footnote 216.

[235] In many females of the series before us, the sulci of the pronotal disk have entirely disappeared.

[236] Every degree occurs from a decidedly reduced type (particularly in material from Iowa and Nebraska to Texas) in which the tegmina are but little longer than the pronotum, to a partially caudate type (one specimen; Natchez, Mississippi) in which the sinistral tegmen alone extends well beyond the apices of the cerci, but is not as ample as in the male.

[237] In the supra-anal plate, the lateral margins vary to a condition in which they are concave in large portion, the apex varying from bluntly to sharply rounded.

[238] See footnote 233.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Montreal, Quebec		22	4.8	5.9	22.7	6.4
Lakehurst, New Jersey		19.7	4.2	5.4	20.2	5.8
Philadelphia, Pennsylvania		20	4.8	6	23.1	6.4
Great Falls, Virginia		21	4.8	6.7	24.6	7
Asheville, North Carolina	(2)	20–21.7	4.6–4.8	6–6.2	22.4–23.9	6.4–6.3
Richmond, Indiana	(3)	18.5–19.5	4.2–4.8	5.8–6.1	24.1–24.3	6.4–7.7
Hurricane Mills, Tennessee	(3)	22–21.5	5–5.3	6.4–6.9	22.5–25.1	6.3–7.1
Decatur, Alabama		20.4	4.7	5.9	19.9	6.2
Natchez, Mississippi		18.2	4.7	5.7	19.5	5.8
South Bend, Missouri	(2)	19.8–19.4	4.8–4.9	6.3–5.8	21.7–23.3	6.2–6.4
Atoka, Oklahoma		17.2	4.6	5.5	19.8	5.8
Stillwater, Oklahoma		24.5	5.2	6.5	24.8	6.3
Waco, Texas	(8)	16.8–21.3	4.2–4.8	5.6–6.2	17.3–22.2	5.4–6.4
Extremes in series		16.8–24.5	4.2–5.3	5.4–6.9	17.3–25.1	5.4–7.7
♀						
Montreal, Quebec		17	5.2	6.4	10.7	5.2
Lakehurst, New Jersey	(4)	13–13.5	4.3–4.4	5.4–5.8	9.8–11.7	4.4–4.8
Wildwood Junction, New Jersey	(5)	15–17.5	4.7–5	6.2–6.4	13.7–13.9	5.2–5.2
Sunbury, Pennsylvania		14.5	4.8	6	7.8	4.2
Mount Airy, Pennsylvania	(2)	17–18	4.8–5	6.6–6.8	11.3–12.2	5–5.4
Washington, District of Columbia	(7)	14.5–16.2	4.8–5.8	5.1–6.7	11.4–11.6	5.1–5.2
Great Falls, Virginia	(3)	17–18	5–5.7	6.7–7.2	12–12.2	5.4–5.7
Black Mountains, North Carolina	(3)	16–16.5	4.7–4.8	5.7–5.8	9.3–9.8	4.9–5.3
Clayton, Georgia		15.3	4.4	5.8	11.8	4.7
Marion County, Indiana		15.5	5.1	6.7	11.2	5
Natchez, Mississippi	(3)	16.7–15.2	4.7–4.8	5.7–6.1	16.8[239]–9.8	5.2–4.8
Bloomsboro. Iowa	(2)	12.7–16	4.6–5	5.7–6.3	9.8–7.7	4.5–4.8
Iowa City, Iowa		16.5	4.9	6.2	6.9	4.6
Nebraska City, Nebraska		13.5	4.7	6	6.9	4.5
Osage, Kansas		14.7	4.8	—	10	4.7
Howe, Oklahoma		14.7	4.8	6.3	7.8	4.6
Waco, Texas		14.8	4.7	5.8	6.4	4.2
Extremes in series		12.7–18	4.3–5.8	5.1–7.2	6.4–16.8	4.2–5.7

[239] The sinistral tegmen alone is caudate, a condition found only in this female among the many examples before us. The dextral tegmen is not as unusual, 12.2 mm. in length.

Biometric and color variations in the present insect are equally striking, both due in large part to individual variation. The extremes of the different types, particularly in the female sex, are so very different in general appearance that little surprise should be felt at the considerable synonymy. Indeed, without large series for illustration, the difficulty would be to convince even the experienced worker that such decidedly different appearing insects represent one and the same species.

Coloration.—♂. (Normal.) (Philadelphia, Pennsylvania.) Head with occiput chestnut; below this, to margin of clypeus, blackish chestnut brown; genae and remaining portions of clypeus cinnamon-buff. Ocelli cream color. Underparts and abdomen heavily suffused with blackish chestnut brown, the latter mesad, and on the proximal segments briefly proximo-laterad, cinnamon-buff. Limbs cinnamon-buff, the ventral femoral and dorsal tibial margins and spines washed with chestnut brown. Pronotum with disk and caudal margin blackish chestnut brown, except mesad, where a narrow, longitudinal, suffused line of hazel occurs; remaining narrow cephalic and broader lateral portions of pronotum warm buff, the lateral portions in large part transparent. Tegmina transparent, heavily washed with cinnamon brown, with marginal field and proximal portions of scapular field very feebly washed with cinnamon brown, proximal portion of humeral vein blackish brown. Dorsal surface of abdomen ochraceous-tawny, heavily suffused laterad and distad (including supra-anal plate and cerci) with blackish chestnut brown. In the maximum recessive condition the browns are all more dilute and occasionally the disk of the pronotum is alone darkened.[240] (Maximum intensive.) (Waco, Texas.) Head, underparts and limbs cinnamon brown, the limbs more solidly of a darker shade. Abdomen blackish chestnut brown. Pronotum dark chestnut brown from narrow area on cephalic margin expanding through disk to and including entire caudal margin, lateral margins sharply defined in warm buff. Tegmina translucent, deep cinnamon brown, with marginal field sharply defined in light buff. Dorsal surface of abdomen

[240] In this condition resembling more closely males of *divisa* in general coloration.

tawny, heavily suffused with dark cinnamon brown. Numerous differences in shade and contour[241] of the markings is shown by the series before us, linking up in every way the extremes. The southwestern material averages near the maximum intensive, but in all series individual differences are found.

♀. (Maximum recessive.) (Staten Island, New York.) Head with vertex ochraceous-buff, below with a vertical blackish chestnut brown band, which is narrowest below the antennal sockets, ocellar spots and genae warm buff. Underparts and limbs antimony yellow, the former mottled with blackish brown; ventral surface of abdomen mesad cinnamon brown, with broad lateral margins of suffused antimony yellow and subgenital plate suffused ochraceous-tawny. Pronotum with disk heavily clouded with russet, which shades into the narrow cephalic and broader lateral margins of ochraceous-tawny.[242] Every gradation is found from this to the following condition. (Normal eastern, occasional western.) Browns darker and more solid. Disk of pronotum mars brown, this marking continued to and including all of the caudal margin of the pronotum, but with a medio-longitudinal streak of tawny; this marking not sharply defined from the moderately broad cephalic and broader lateral margins of the pronotum, which are antimony yellow. Tegmina translucent mars brown, with marginal and proximal portions of scapular fields much paler, warm buff, the latter suffused. Dorsal surface of abdomen blackish brown, the segments margined with ochraceous-tawny laterad to individually variable degrees. Many intermediates in the series connect this with the following striking type. (Maximum intensive.) (Rare eastern, frequent northwestern, normal southwestern.) Head blackish chestnut brown, except ocellar spots and lateral portions of genae, which are antimony yellow. Underparts and limbs cinnamon brown, ventral surface of abdomen blackish chest-

[241] Two distinct types of pronotal marking occur, these particularly striking in the maximum intensive coloration. In one, the lateral margins of the dark area are nearly straight; in the other, these margins bordering the disk of the pronotum are there decidedly convex.

[242] Such females are the most difficult to separate from those of *divisa*. But one other specimen before us, from Lakehurst, New Jersey, shows this degree of recession, the genae, however, being much suffused with dark brown.

ı, shading to russet meso-proximad. Pronotum solid
ıestnut brown, except lateral margins, which are sharply
antimony yellow. Tegmina translucent blackish chest-
nu n, with marginal fields sharply defined in warm buff.
of the young of this species before us are uniform blackish
brown, occasional specimens are paler brown, while in the
m Thomasville, Georgia, the lateral margins of pronotum,
ı ı and metanotum are strikingly pale buffy. This is
a lesser degree in one from Natchez, Mississippi, and
ıe pronotum in a number immature eastern examples.
the ootheca is carried with suture directed either
r laterad. Females before us with ootheca in the former
are from Montreal, Quebec, and Steuben County, Indi-
the latter position from Jan sburg, New York; Harris-
nnsylvania, and Natchez, l ssissippi. The ootheca has
rather strongly co ı as i *divisa*, with surface smooth
a serrations of suture s lo er and wider than in that
species. It averages decide lo er than in any other species of
the genus except *lata* (Harrisburg, nsylvania, 10.2 by 4.2 mm.).

The present species has the wi distribution of any of the genus in the United States, coverin ore than the eastern half of this country and extending into southern Canada. Its northernmost known limits are Scarboro, Maine; Abbotsford and Montreal, Quebec; Sudbury, Ontario; Saginaw Bay, Michigan and the south shore of Lake Superior, and Polk County, Wisconsin. The westernmost records are Valentine, Nebraska; Clearwater, Kansas, and Byers, Waco and Brownsville, Texas. Southeastward the species is not as yet known beyond Raleigh, North Carolina; Spartanburg, South Carolina, and Thomasville, Georgia.

Specimens Examined: 199; 75 males, 77 females and 47 immature individuals.
Montreal, Quebec, (Caulfield), 1 ♂, 1 ♀ with ootheca, [M. C. Z.].
Prout's Neck, Maine, 3 ♀, [M. C. Z.].
Winthrop, Massachusetts, (Mrs. H. E. Scudder), 1 ♂, [M. C. Z.].
Staten Island, New York, VI, (W. T. Davis,) 1 ♂, [Hebard Cln.]; 1 ♀, [Davis Cln.].
Jamesburg, New Jersey, VI, 22, , (W. T. Davis), 1 ♀ with ootheca, [Davis Cln.].

Lakehurst, N. J., VI, 14, 1908, (W. T. Davis), 1 ♂; VII, 11 to VIII, 15, 1911, (W. T. Davis), 4 ♀, [all Davis Cln.].

Stafford's Forge, Ocean County, N. J., VIII, 30, 1914, (Rehn; in oak and pine woods), 1 ♀, [A. N. S. P.].

Da Costa, N. J., VII, 29, 1904, (E. Daecke), 1 ♀, [Hebard Cln.].

Wildwood Junction, N. J., VII, 28 to VIII, 14, 1914, (Hebard; trapped, molasses jars in oak forest), 5 ♀, [Hebard Cln.].

Lake Weassanking, Bradford County, Pennsylvania, (J. Willcox), 2 ♀, [A. N. S. P.].

Ivy Hill, Mount Airy, Pa., VI, 12 to 30, 1914, (Hebard; trapped, molasses jars in chestnut forest), 2 ♀; VII, 1 to 11, 1914, (Hebard; same data), 1 juv. ♂, [all Hebard Cln.].

Tulpehocken, Pa., VII, 1 to 11, 1914, (Hebard; trapped, molasses jar on knoll with high deciduous trees), 1 ♀, [Hebard Cln.].

Wissahickon and Lincoln Drives, Philadelphia, Pa., VI, 4 to 9, 1914, (Hebard; trapped, molasses jar in heavy ravine forest), 1 ♀, [Hebard Cln.].

West Philadelphia, Pa., VI, 9, 1 ♂,]A. N. S. P.].

Danville, Pa., V, 29, 1 ♂, [Pa. State Dept. Zool.].

Fisher's Ferry, Pa., V, 29, 1 ♂, [Pa. State Dept. Zool.].

Sunbury, Pa., VII, 1 ♀, [M. C. Z.].

Rockville, Pa., I, 26, 1913, 1 juv., [Pa. State Dept. Zool.].

Harrisburg, Pa., VII, 18, 2 ♀, 1 with ootheca, [Pa. State Dept. Zool.].

Camphill, Pa., V, 23, 1 ♀, [Pa. State Dept. Zool.].

Gettysburg, Pa., IV, 22, 1 juv. ♂, 1 juv. ♀, [A. N. S. P.].

McConnellsburg, Pa., VI, 4, 1905, 1 ♂, [A. N. S. P.].

Transfer, Pa., IV, 1, 1908, 1 juv. ♀, [Pa. State Dept. Zool.].

Beatty, Pa., (O. Brugger), 1 ♀, [A. N. S. P.].

Penn Station, Pa., V, 29, 1905, 2 ♂, [A. N. S. P.].

Laurel, Delaware, VI, 7, 1908, (B. Long), 1 ♂, [A. N. S. P.].

Chestertown, Maryland, VIII, 1, 1904, (E. G. Vanatta), 1 ♀, [A. N. S. P.].

High Island, Md., VII, 1, 1904, (A. N. Caudell), 1 ♀, [U. S. N. M.].

Glendale, Md., VII, 3, (Mrs. Nellie Caudell), 1 ♀, [U. S. N. M.].

Washington, District of Columbia, VI, 2 to 29, (W. T. Davis; 4 ♀ trapped, molasses jar), 2 ♂, 7 ♀, [U. S. N. M., Davis and Hebard Clns.].

Great Falls, Virginia, VI, 27, 1911, (W. T. Davis), 1 ♂, 3 ♀, [Davis Cln.].

Alexandria County, Va., IX, 1911, (W. T. Davis; trapped, molasses jar), 1 juv. ♂, [Hebard Cln.].

Falls Church, Va., VII, 28, 1 ♀, [U. S. N. M.].

Fredericksburg, Va., VII, 20, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Nelson County, Va., VI, 21, 1914, (W. Robinson), 1 ♂, [U. S. N. M.].

Hot Springs, Bath County, Va., 2400 feet, VIII, 3 to 25, 1916, (Hebard; night, attracted to molasses on chestnut and white oak trunks,) 1 ♀, 9 juv.,[243] [Hebard Cln.].

[243] Kept alive, active and considerably larger, June, 1917.

[illegible] Mountain, Bath County, Va., 2800 feet, VII, 10, 1916, (Hebard; under bark of decaying chestnut log), 2 oothecae, [Hebard Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 5, 1916, (Hebard; under bark of dead chestnut stump), 1 ♀ with ootheca; VII, 8 to 14, 1916, (Hebard; trapped molasses jar), 1 ♀, [both Hebard Cln.].

Montgomery County, Va., V, 26, 1899, (E. A. Smyth Jr.), 1 ♂, [Hebard Cln.].

Wellsburgh, West Virginia, 1910, (Mrs. Green), 1 ♂, [U. S. N. M.].

Raleigh, North Carolina, VI, 2, 1904, (C. S. Brimley), 1 ♂, [Hebard Cln.].

Black Mountains, N. C., V, 31 to VI, 6, 1912, (W. Beutenmüller), 3 ♀, [Cornell Univ. Cln.].

Sulphur Springs, Buncombe County, N. C., 2500 feet, V, 25 and 30, 1904, (Hebard), 2 ♂, [Hebard Cln.].

Spartanburg, South Carolina, VIII, 6, 1913, (Hebard; under signs on trees), 1 ♀, 5 juv. ♂, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

Clayton, Georgia, V, 18 to 26, 1911, (J. C. Bradley), 1 ♂, [A. N. S. P.]; VI, 1909, (W. T. Davis), 1 ♀, [Hebard Cln.].

Thomasville, Ga., III, 23 and IV, 9, 1904, (Hebard; under signs on oaks), 7 juv. ♂, [Hebard Cln.].

Sudbury, Ontario, (D. H. Haight), 2 ♂, [[illegible]yn. Inst.].

Meigs County, Ohio, (Samuels), 1 ♂, [M. C. Z.].

Richmond, Indiana, (J. A. Allen), 3 ♂, [M. C. Z.].

Crawford County, Ind., VII, 2, 1902, (W. S. Blatchley), 1 ♂, [Hebard Cln.].

Marion County, Ind., V, 30, 1897, (W. S. Blatchley), 1 ♀, [Hebard Cln.].

Steuben County, Ind., VIII, 11, 1903, (W[illegible] Blatchley), 1 ♀, [Hebard Cln.].

Ogle County, Illinois, (J. A. Allen), 1 ♂, [[illegible] C. Z.].

Mossville, Ill., V, 1889, (F. Blake), 1 ♂, 1 juv. ♂, [M. C. Z.].

White Heath, Ill., VI, 17, 1911, 1 ♀, [Hebard Cln.].

Carbondale, Ill., VI, 25, 1909, (at light), 1 ♂, [U. S. N. M.].

Western States, (A. Agassiz), 2 ♂, 1 ♀, latter *cotype* of *Ectobia flavocincta* Scudder, [M. C. Z.].

Michigan, 1 ♂, [Davis Cln.].

Lake Superior, (A. Agassiz), 1 ♀, *cotype* of *Ectobia flavocincta* Scudder, [M. C. Z.].

Cranmoor, Wisconsin, VI, 5, 1910, (C. W. Hooker), 1 ♀, [U. S. N. M.]; VII, 7, 1909, (C. B. Hardenberg), 1 ♂, [A. N. S. P.].

Polk County, Wis., VII, (C. F. Baker), 1 ♂, [A. N. S. P.].

Madison, Wis., V, 10, 1915, (A. C. Burrill), 1 ♂; IX, 20, 1916, (L. G. Gentner), 1 juv. ♂, [both Wisc. Agr. Exp. Sta. Cln.].

Dodgeville, Wis., VI, 10, 1914, (at light), 1 ♂, [Wisc. Agr. Exp. Sta. Cln.].

Lancaster, Wis., VI, 8, 1914, (at light), 1 ♂, [Wisc. Agr. Exp. Sta. Cln.].

Minnesota, V, 1 ♂, [Hebard Cln.].

Ramsey County, Minn., VII, 2, 1 ♂, [Minn. Dept. Agr. Cln.].

Gray Cloud, Minn., VIII, 15, 1895, 1 ♀ with ootheca, [Minn. Dept. Agr. Cln.].

Nashville, Tennessee, VI, 9, 1914, (G. G. Ainslie; at light), 1 ♂, [U. S. N. M.].

Hurricane Mills, Tenn., (G. G. Ainslie), 3 ♂, [U. S. N. M.].

Decatur, Alabama, (B. Shimek), 1 ♂, [Hebard Cln.].
Brookfield, Missouri, (E. P. Austin), 1 ♀, [M. C. Z.].
St. Louis, Mo., VI, 10, 1904, (W. V. Werner), 1 ♂, [U. S. N. M.].
Mountain Grove, Mo., IV, 7, 1916, (M. P. Somes), 3 juv. ♂, [Somes Cln.].
Natchez, Mississippi, V, 20 to VI, 3, 1909, (E. S. Tucker; 2 at sugar, 1 in dead oak) 3 juv. ♀; VI, 7 to 10, 1909, (E. S. Tucker; ♂ at light, ♀ ♀ at sugar), 1 ♂, 3 ♀, [all U. S. N. M.].
Logansport, Louisiana, VI, 6, 1906, (W. D. Pierce), 1 ♂, [U. S. N. M.].
Muscatine, Iowa, V, 17, 1909, (M. P. Somes), 1 ♂, [Somes Cln.].
Fruitland, Ia., VI, 17, 1915, (M. P. Somes), 1 ♀, 1 juv. ♀, [Somes Cln.].
Iowa City, Ia., VIII, (B. Shimek), 1 ♀, [Hebard Cln.]; IX, 10, 1910, (M. P. Somes), 1 ♂, [Somes Cln.].
Des Moines, Ia., VIII, 21, 1908, (M. P. Somes), 2 ♂, [Somes Cln.].
Dallas County, Ia., VIII, 4, (J. A. Allen; in rotten logs and stumps), 2 ♀, [M. C. Z.].
Bloomsboro, Ia., VII, 1867, (J. A. Allen), 2 ♀, [M. C. Z.].
Valentine, Nebraska, VIII, 1888, 1 ♀, [Hebard Cln.].
Badger, Nebr., 1 ♀, [Hebard Cln.].
South Bend, Nebr., III, 11, 1910, (L. Bruner), 2 ♂; 3 juv. ♂, 3 juv. ♀, [all Hebard Cln.].
Lincoln, Nebr., VI, (L. Bruner; at light), 1 ♂, [Hebard Cln.].
Nebraska City, Nebr., VI, 1 ♂, 1 ♀, [Hebard Cln.].
Platte River, (Hayden), 1 ♀, *type* of *Temnopteryx marginata* Scudder, [M. C. Z.].
Hiawatha, Kansas, VIII, 1904, (F. B. Isely), 1 ♀, [U. S. N. M.].
Topeka, Ks., (F. W. Cragin), 2 juv. ♂, [Hebard Cln.].
Osage, Ks., (Stolley), 1 ♂, 1 ♀, [M. C. Z.].
Independence, Ks., (A. Birchfield), 1 ♂, [Hebard Cln.].
Stillwater, Oklahoma, (A. N. Caudell), 1 ♂, [U. S. N. M.].
Howe, Okla., VIII, 4, 1905, (A. P. Morse), 1 ♀, [Morse Cln.].
Atoka, Okla., VII, 29, 1905, (F. C. Bishopp), 1 ♂, [U. S. N. M.].
Byers, Texas, VII, 1910, (F. B. Isely), 1 ♀, [U. S. N. M.].
Dallas, Tex., (J. Boll), 2 ♂, [M. C. Z.].
Waco, Tex., V, 5 to VII, 16, (Belfrage; coming to light at night, not common), 8 ♂, 1 ♀, [M. C. Z.].
Esperanza Ranch, Brownsville, Tex., V, 25, (C. Schaeffer), 1 ♂,[244] [Bklyn. Inst.].

SYMPLOCE Hebard

1916. *Symploce* Hebard, Trans. Am. Ent. Soc., xlii, p. 355.

This genus differs from both *Ischnoptera* and *Parcoblatta*, in the weak but evident mesal production of the caudal margin of the pronotum, even convexity of the same without discal sulci, even in individuals having fully developed tegmina and wings, longi-

[244] Recorded incorrectly by Caudell as *couloniana*.

tudinal discoidal sectors of the tegmina, strikingly bifurcate discoidal vein of both tegmina and wings, type A armament of ventro-cephalic margins of cephalic femora and differently specialized dorsal abdominal segments and styles in males.

Five species in addition to the genotype are known, all of which are confined in distribution to the West Indies except the species here considered.

GENOTYPE, by original designation: *Symploce capitata* (*Ischnoptera capitata*) (Saussure).

Generic Description.—Pronotum much as in *Ischnoptera*, except that the disk is smooth and evenly convex without sulci, and the caudal margin is weakly obtuse-angulate produced with broadly rounded apex mesad. Tegmina and wings fully developed.[245] Tegmina with discoidal sectors (these including branch of discoidal vein, median and ulnar veins and their branches; the ulnar vein normally showing more branches than the median vein) longitudinal. Wings with area between discoidal vein and anterior margin moderately narrow, slightly broader than in *Ischnoptera*, the width greatest a little distad of the mesal point. Mediastine vein extending slightly more than half the distance to the apex of the wing, from which vein spring a number of the costal veins; none of the costal veins enlarged. Discoidal vein dividing mesad, the two portions equally decided and showing only inconspicuous distal furcations; a number of weak, well-spaced, nearly perpendicular veinlets connect this vein with the median vein. Ulnar vein weakly curved, with few (one to three) incomplete proximal rami and more (four to five) distal rami extending to the margin of the wing. Intercalated triangle small. Median segment of males specialized.[246] When other specialization of the dorsal abdominal segments occurs in males, this is confined to the sixth and eighth segments; no appendages occur as in *Ischnoptera*. Male subgenital plate asymmetrical, with variously highly specialized styles. Cephalic femora with ventro-cephalic margins armed with rather heavy elongate spines, which decrease gradually in length mesodistad and are terminated distad by three longer (in increasing

[245] Except in the female of *lita*.

[246] Except in *lita*.

ratio) distal spines. Other ventral margins of femora furnished with not numerous, heavy, elongate spines. Median and caudal femora, in addition, supplied with a single, elongate, heavy genicular spine. Pulvilli as in *Parcoblatta*. Small arolia present.

All of the species of this genus known to us are pale in general coloration; buffy, in some species moderately to strongly tinged with ochraceous. Distinctive characters of coloration are entirely lacking in nearly all of the forms.

Symploce lita Hebard (Plate II, figures 16 to 20.)

1916. *Symploce lita* Hebard, Trans. Am. Ent. Soc., xlii, p. 357, pl. XVII, fig. 8, pl. XVIII, figs. 1, 2, 3 and 4. [♂, ♀; records listed in present paper.]

The characters given above to separate the present genus from *Ischnoptera* and *Parcoblatta*, readily separate males of the present species from those of any other found over the regions at present under consideration. In the present genus this species is anomalous in the males having the median segment unspecialized and the supra-anal plate, subgenital plate and styles of an entirely different type from those of the males of the other species of the genus.

In the female the tegmina are decidedly reduced, subquadrate, with characters of venation obliterated; thus differing widely from the other known species of the genus, the females of all of which have the tegmina fully developed. This tegminal reduction in the present species gives females a distinct, though superficial, resemblance to females of *Parcoblatta virginica*.

Type.—♂; Key West, Florida. July 4, 1912. (M. Hebard.) [Hebard Collection, Type No. 423.]

Description of Type.—Very similar in general structure to *S. jamaicana*, size medium small, slightly larger than in that species; form moderately slender, as in *jamaicana;* slightly more slender than in *S. capitata*. Head with eyes large, larger than in *jamaicana* or *capitata*. Interocular space three-fifths as wide as interocellar space. Ocelli distinct, with surfaces flat and almost perpendicular to the plane of the interocellar area, their margins there sharply rounded. Maxillary palpi with third and fifth (distal) joints subequal in length, fourth joint slightly shorter. Pronotum of same form as in *capitata* but proportionately deeper. Tegmina and wings fully developed, as given in generic description, structure of same very delicate. Median segment unspecialized. Sixth dorsal abdominal segment with two moderately deep, small, meso-proximal depressions, between which it is

t[illegible]y raised with apex proximad, this portion thickly clothed with hairs, c[illegible]rgin of segment rather strongly concave; seventh segment concealed, exce[illegible]rowly laterad; eighth segment with narrow distal portion exposed, distal marg[illegible]rongly concave. Supra-anal plate transverse, not extending to distal extre[illegible] of subgenital plate, lateral margins strongly convergent and rounding into [illegible]ly transverse mesal portion, lateral margins furnished with a well spaced [illegible]inute, chitinous spines. Cerci slender, lateral margins crenate, with eleven and twelve distinct joints, dorsal surface flattened, ventral surface convex. Subgenital plate weakly produced, asymmetrical; dextral free margin produced oblique, nearly straight but strongly upcurved to just beyond mesal point, there supplied with a minute, stout projection (style), with apex flat and margin slightly produced sinistrad, at the dextral base of which is a sharp, chitinous, curved spine of equal length, sinistrad of this point the margin is sharply and briefly concave, from which springs a projection (style) which is over twice as long but more slender than the dextral style, curved dextrad, with apex tapering and armed meso-distad with two minute, chitinous spines, beyond this the sinistral portion of the free margin is straight, transverse. Limbs and armament of same as given in generic description.

Allotype.— ♀ ;[247] San José del Cabo, Lower California, Mexico. [Hebard Collection.]

Description of Female.—Similar to type in ambisexual characters, differing very decidedly in the following features. Head with eyes distinctly smaller; interocular space very broad, slightly broader than space between antennal sockets. Ocelli weakly defined, with ocellar area not as deep as in male and rounding more evenly into interocellar area. Pronotum with caudal margin very weakly angulato-produced.[248] Tegmina greatly reduced, subrectangulate, transversely truncate at apex of anal field, with a weak concavity in discoidal field, distal angle on costal margin broadly rounded, distal angle on sutural margin rectangulate and sharply rounded, sutural margins straight and overlapping. Wings shorter than tegmina, greatly atrophied, but with anterior and posterior fields still defined. Supra-anal plate triangularly produced; lateral margins nearly straight, very weakly and broadly concave; apex blunt, but evenly rounded. Subgenital plate convex, very weakly produced, with free margin weakly convex, except at base of cerci, where a very weak, broad concavity is apparent.

The remaining males and females from Lower California show scarcely any variation in structure from those described.

[247] The present species is domiciliary and apparently widely distributed through the North American tropics.

[248] This is another case of the caudal margin of the pronotum showing truncation in the sex exhibiting reduction in the organs of flight.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida, *type*	14	3.6	4.6	12.8	3.6
San José del Cabo, Lower California	11.5	3.2	3.7[249]	11.1	3.1
San José del Cabo, Lower California	12.7	3.7	4.2	12.7	3.7
♀					
San José del Cabo, Lower California, *allotype*	12.3	3.7	4.6	4.1	3.1
San José del Cabo, Lower California	11.4	3.7	4.3	4.8	3
San José del Cabo, Lower California	11	3.4	4.1	3.9	3.1

Coloration.—♂. Translucent ochraceous-tawny, eyes dark mummy brown, median portion of face ochraceous-tawny. Limbs and abdomen ochraceous-buff, the latter shading to tawny distad. Cerci ochraceous-tawny. The males from Lower California are paler, due to alcoholic bleaching. This must be considered likewise in the females from that locality, which are chestnut to hair brown on head and abdomen, the pronotum and tegmina slightly paler, kaiser brown to hazel. The tegmina are translucent and, in two specimens, very slightly paler than the pronotum.

Specimens Examined: 7; 4 males and 3 females.

Key West, Florida, VII, 4, 1915, (Hebard; in cupboard of hotel with swarms of *Blattella germanica* and a few *Supella supellectilium*), 1 ♂,[250] *type*, [Hebard Cln.].

Vera Cruz, Vera Cruz, Mexico, (A. Sallé), 1 ♂, [Hebard Cln.].

San José del Cabo, Lower California, Mexico, 2 ♂, 3 ♀, *allotype*, (dried alcoholic), [Hebard Cln.].

The Group Pseudomopites

The species discussed below is the only form of this group found in the regions at present under consideration. In consequence, we have here not felt called upon to study the forms of the group, or determine their proper arrangement as fully as has been necessary for the Group Blattellites and Ischnopterites.

[249] Shrivelling, due to drying after immersion in alcohol, has caused some reduction in this dimension in a number of Lower California specimens.

[250] Recorded incorrectly by Rehn and Hebard as *Ischnoptera rufescens* (Beauvois) (= *I. rufa rufa*), (1914).

The Group Pseudomopites includes species nearly all of which are very brilliantly colored. The eyes show a tendency to bulge latero-dorsad, this greatly developed in the genus *Pseudophyllodromia*. The antennae in some genera are plumose to varying degrees in different species. The tegmina and wings are glossy. The tegmina are narrow, and in many genera show the median width less than the width elsewhere, the discoidal sectors are longitudinal, in some genera radiating slightly distad; a striking condition is developed in certain genera, in which these sectors form a distinct angle at the apex of the anal field, either in their direction or with the ulnar vein. The wings have few rami of the ulnar vein, these complete.

PSEUDOMOPS Serville

1831. *Pseudomops* Serville, Ann. Sci. Nat., xxii, p. 41.
1838. *Thyrsocera* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 498. (In part.)

The present genus is not as widely separated from *Pseudophyllodromia* as has been supposed, and should be placed after, not before, that genus, in linear arrangement.

The genus apparently splits into two very distinct groups, while these again divide into minor groups. Of these latter, it would appear that, of the species before us, *septentrionalis*, *discoidalis* and *intercepta* (all North and Central American) are members of one group, while *oblongata*,[251] *affinis*, *angusta* and *annulicornis* (all South American) are members of another. The species of the first group are broader, with broader tegmina and less plumose antennae, than those of the second. Between these groups, the Mexican *cincta* should be placed; having antennae as in the first, but form and tegmina as in the second.

The numerous described species of this genus are confined to tropical America, with the exception of *septentrionalis*, here described. We are not satisfied that the complex does not include several genera, but in any case we are convinced that the species described below is congeneric with the genotype.

[251] We have, unfortunately, no material of *oblongata* before us, or in fact any specimens of the genus from Surinam, the locality from which it was described. From study of the Linnaean and DeGeerian descriptions and figure, however, we are satisfied that the position of this species, the genotype, is as indicated here.

GENOTYPE by monotypy: *Pseudomops oblongata* [*Bl*[*atta*] *oblongata*] (Linnaeus).[252]

Generic Characters.—Eyes showing a tendency to bulge latero-dorsad. Ocellar areas and ocellar spots weakly defined. Antennae, in proximal half, hirsute to plumose. Pronotum considerably obtuse-angulate produced caudad, with apex rounded. Tegmina narrow, with point of least width mesad; discoidal sectors longitudinal, these formed by the median vein and one ramus, which is angled opposite apex of anal field and rami of ulnar vein which spring at an angle from that vein near the apex of the anal field,[253] (the veins which spring from this region numbering three to six). Wings narrow, hyaline, with glassy, iridescent luster; costal veins heavily clubbed distad, this area strongly suffused; intercalated triangle small. Dorsal surface of male abdomen and styles strongly specialized. Limbs elongate and slender; ventro-cephalic margin of cephalic femora armed with few heavy, elongate spines proximad, followed by one or two shorter spines, succeeded by a row of more closely set, stout, shorter spines, which is terminated distad in three elongate spines in increasing ratio; ventro-

[252] Serville refers to the Linnaean species in his generic description, and whether or not the insect before him was correctly determined, has no effect upon the fact that *oblongata* of Linnaeus is the genotype of *Pseudomops*. Kirby has, in error, given *intercepta* of Burmeister as the type of the genus, placing *oblongata* as understood by Serville in the synonymy under that species (Syn. Cat. Orth., i, p. 75, (1904)). This action is unwarranted and erroneous; because Serville gives first a reference to Linnaeus in his description of the genus, and also gives the locality Surinam, while Kirby himself assigns to *intercepta* only Central American localities. Shelford (see papers—Trans. Ent. Soc. London, 1906, p. 252, (1906) and Trans. Ent. Soc. London, 1907, p. 458 (1908)), has supported Kirby in the view that *oblongata* of Linnaeus and of Serville represent distinct forms, that of the latter author being the same as Burmeister's *intercepta*. We do not agree with this conclusion and believe that *oblongata* of Linnaeus and Serville, both described from material from Surinam, represent probably the same species—certainly both are distinct from the Central American *intercepta* of Burmeister.

[253] The ulnar vein, at the apex of the anal field, reaches a small area where all the veins are subobsolete; from this area spring, at an angle to the ulnar vein, veins which have been termed its rami. It would appear to us, however, that, though the first one or two of these veins constitute continuations of the ulnar vein, the remaining veins, toward the sutural margin, are rather continuations of the axillary veins, which have been broken for a brief distance at the apex of the anal field by the anal sulcus. (See Pl. VI, fig. 5.)

These veins radiate slightly distad, due to the greater width there of the surface which they occupy; the vein adjacent to the sutural margin, however, parallels it for its entire length.

caudal margin of cephalic femora and ventral margins of other femora heavily spined. Tarsi elongate, four proximal joints each bearing a small distal pulvillus. Small arolia present.

Pseudomops septentrionalis new species (Plate VI, figures 5 to 8.)

1900. *Thyrsocera cincta* Scudder, (not of Burmeister, 1838),[254] Proc. Davenport Acad. Nat. Sci., viii, p. 7. [[♂, ♀]: Texas.]

1904. *Thyrsocera cincta* Caudell, (not of Burmeister, 1838), Mus. Brooklyn Inst. A. & S., Sci. Bull., i, p. 105. [♂: Topo [Stage station near Brownsville], Texas.]

1907. *Pseudomops oblongata* Rehn, (not *Blatta oblongata* Linnaeus, 1758),[255] Ent. News, xviii, p. 209. [♀: Brownsville, Texas.]

1913. *P[seudomops] intercepta* Caudell, (not of Burmeister, 1838), Proc. U. S. Nat. Mus., xliv, p. 603. (Altering record of *oblongata* from the United States.)

That the present species has in the past not been recognized as undescribed, is due to the fact that, at the time the previous records were made, insufficient material of the more southern species was at hand.

The present insect is very closely related to *P. intercepta*,[256] differing from that species in the pronotal coloration (which never shows the distinctive pattern usual in the Mexican insect), slightly

[254] 1838. *Th[yrsocera] cincta* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 499. [Mexico.] Compared with *P. septentrionalis* this species is found to have also non-spatulate cerci and non-plumose antennae, but is smaller, distinctly more slender, with black antennae not annulate, pronotum less transverse, distinctly narrower tegmina marked mesad with a dark longitudinal intramarginal stripe and distinctive primary and secondary male sexual features. These observations are based on three males before us from Orizaba, Vera Cruz, Mexico, which have been correctly recorded by Rehn.

[255] 1758. *B[latta] oblongata* Linnaeus, Syst. Nat., Ed. X, i, p. 425. [America.] This species is not at all closely related to *P. septentrionalis*, as it belongs to a different group of species, showing likewise non-spatulate cerci, but decidedly more slender in form, with plumose antennae. The peculiar pronotal markings and plumose antennae are described by Linnaeus; De Geer later figures the species showing plainly these characters, his material coming from Surinam and almost certainly from the same series as the type, as has been pointed out by Shelford, Trans. Ent. Soc. London, 1907, p. 457, (1908).

[256] 1838. *Bl[atta] intercepta* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 497. [Mexico.]

The comparisons here made are based on the following specimens of this species.

Distrito Federal, Mexico, (J. R. Inda), 2 ♂, 2 ♀, [U. S. N. M.].

San Rafael, Vera Cruz, Mexico, (C. H. T. Townsend), 1 ♂, 5 ♀, [Hebard Cln.].

Orizaba, Vera Cruz, Mexico, I, 1892, 2 ♂, 1 ♀, [Hebard Cln.]; I, 9 to 16, 1892, (H. Osborn), 2 ♀, [U. S. N. M.].

Cordoba, Vera Cruz, Mexico, VI, 10 and 11, 1908, (F. Knab), 1 ♂, 1 ♀, [U. S. N. M.].

Vera Cruz, Vera Cruz, Mexico, 1911, (F. W. Urich), 2 ♀, [U. S. N. M.].

Teapa, Tabasco, Mexico, (H. H. Smith), 1 ♀, [A. N. S. P.].

stouter form, slight differences in the costal veins of the wings[257] and differently shaped genital hook in the male.[258]

Type.—♂; Brownsville, Cameron County, Texas. July 31, 1912. (M. Hebard.) [Hebard Collection Type No. 410.]

Description of Type.—Size medium, form stout for the group. Head projecting slightly beyond pronotum, interocular space subequal to that between antennal sockets, ocellar areas very small and weakly defined, ocellar spots feebly indicated. Antennae covered with minute hairs, particularly in proximal half, which is slightly enlarged (but by no means plumose as in certain species of the genus). Maxillary palpi moderately stout; third joint elongate, fourth distinctly shorter and expanding evenly distad, fifth (distal) distinctly longer than third, enlarged, with oblique truncation reaching four-fifths of distance to base. Pronotum subcircular; evenly convex to lateral margins, which have a very briefly reflexed border (this visible only under a microscope); cephalic margin transverse, straight; cephalic and laterocaudal angles broadly rounded; lateral margins very weakly convex; caudal margin moderately produced and obtuse angulate mesad, with angle broadly rounded. Tegmina with numerous longitudinal discoidal sectors (normally seven or eight). Wings with proximal half of costal veins evenly and weakly thickened distad, buffy, with veins distinctly buffy, this whole area resultantly not transparent. Abdomen with second and third dorsal segments each supplied mesad with twin groups of long hairs directed caudad, many of these adhering at their distal extremities; fourth and fifth unmodified; sixth wholly concealed excepting lateral portions, which are very strongly produced distad with apices evenly rounded, extending as far caudad as mesal portion of caudal margin of seventh segment, concealed portion of sixth segment convex above concavity of seventh segment; seventh segment concave mesad, with a small median projection proximad, from which spring two small, adjacent, closely adhering, slender projections of hairs curving outward distad, the segment with a distinct medio-longitudinal sulcus from this point to the caudal margin, which is broadly and weakly emarginate mesad, laterad the segment is weakly produced with margin rounded; eighth segment transversely narrower, deplanate, caudal margin weakly concave, with a small nick opposite each cercal base. Supra-anal plate triangularly produced, with broad apex rounded. Cerci elongate tapering, with (normally eleven) distinct joints. Genital hook springs from a large, chitinous area situated meso-dextrad, not very elongate, chitinous, stout, curving weakly inward and tapering to acute apex. Subgenital plate smooth and convex exteriorly, with caudal margin roughly convex; intro-sinistrad on this margin is a stout, tapering, corneous style, with ventral surface heavily

[257] In *intercepta*, the vicinity of the swollen portions of the costal veins of the wings does not appear to be normally as much suffused with buffy and in consequence is less opaque.

[258] In these species the male abdominal and genitalic characters agree fully, except that in *intercepta* the genital hook is decidedly longer and more slender, with distal extremity very slightly enlarged.

toothed; intro-dextrad on this margin is a larger, roughly anvil-shaped, corneous style, with inner margin bearing stout teeth and pointed extremity projecting proximo-laterad, elongate, acicular. Between these styles and the cercal bases, along the inner surface of the subgenital plate near its margin, are scattered minute, chitinous teeth.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Very similar to male, differing in the following features. Head very slightly broader. Pronotum slightly more ample. Dorsal surface of abdomen unmodified. Supra-anal plate very broadly shield-shaped. Subgenital plate large, scoop-shaped, with caudal margin roughly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Dallas, Texas		10.3	3.7	3.9	11.8	3.2
Waco, Texas		10.5	3.7	4	11.4	3.1
Zavalla County, Texas		11.8	3.8	4.2	11.4	3.3
Brownsville, Texas, *type*		10.2	3.7	4	11	3.2
Brownsville, Texas, *paratypes*	(6)	10–11.4	3.5–3.8	3.9–4	10.8–11.3	3.1–3.3
♀						
Dallas, Texas	(2)	11–11.8	3.8–4.2	4.3–4.7	10.9–11.9	3.4–3.6
Waco, Texas	(2)	9.5–10.5	3.8–3.9	4.2–4.7	11.6–11.7	3.3–3.4
Columbus, Texas	(2)	11.2–11.5	3.8–3.9	4.2–4.4	11.9–12.2	3.4–3.7
Zavalla County, Texas		15	4.8	5.3	13.7	3.9
Brownsville, Texas, *allotype*		10	3.9	4.6	11.1	3.2
Brownsville, Texas, *paratypes*	(23)	9.8–11.9	3.8–4.3	4.2–4.7	11–12.1	3.2–3.4
Saltillo, Coahuila, Mexico		9	3.7	4	9	3
San José, Tamaulipas, Mexico		11.9	3.8	4.4	13	3.6

The above measurements indicate little geographic size variation in the United States; the specimen from Saltillo, Mexico, is, however, distinctly depauperate.

Coloration.—General color glossy, individually russet to brownish black. Head tawny, occasionally darker below the occiput. Antennae dark in proximal half, with eight to twelve mesal joints warm buff, distal portion of general coloration. Pronotum cinnamon-rufous, broadly margined with cream color, this narrowest cephalad. The mesal reddish brown portion is often immaculate,

sometimes a darker suffusion occupies the caudal margin of this area, this darker suffusion is occasionally produced cephalad on the sides, or further developed and reuniting cephalad, thus sometimes leaving but a small mesal spot of reddish brown; in specimens of the maximum intensive coloration, all but the warm buff pronotal margins is suffused, shining blackish brown. Tegmina of general coloration, moderately broadly bordered on the costal margin with cream color. Costal area of wing suffused with general coloration, mesal portion of this area warm buff, this extending, to varying degrees, toward the wing margin; other portions of wing transparent, moderately iridescent, with veins of general coloration and distal portion of wing weakly suffused with the same. Limbs and ventral surface of body tawny, individually varying to dark mars brown; ventral abdominal segments usually very narrowly margined laterad with cream color.

Though sometimes found in litter on the ground, this species is more often encountered in the foliage of heavy weeds and about flowers.

Specimens Examined: 56; 14 males and 42 females.

Dallas, Texas, VI, 8 to VIII, 1, (J. Boll), 1 ♂, 3 ♀,[259] [M. C. Z. and Hebard Cln.].

Waco, Tex., V, 12 to VIII, 8, (Belfrage; a very rare species found at night), 1 ♂, 2 ♀, [M. C. Z.].

Blanco County, Tex., 1 ♀, [A. N. S. P.].

Columbus, Tex., VI, 22, 1 ♂, [U. S. N. M.]; VII, 30, 2 ♀, [Univ. Kansas and Hebard Cln.].

Zavalla County, Tex., IV, 27, 1910, (Hunter and Pratt), 1 ♂, 1 ♀, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 1 ♀, [Hebard Cln.].

Del Rio, Tex., VI, 22 to 27, (H. Wickham), 1 ♀, [Hebard Cln.].

Mercedes, Tex., II, 1909, (T. D. Usbahns), 1 ♂, [U. S. N. M.].

Santa Maria, Tex., V, 29, 1895, 1 ♀, [U. S. N. M.].

Brownsville, Tex., 1 ♀; (C. H. T. Townsend), 1 ♀; IV, 30 to VI, 5, 1904, (H. S. Barber), 2 ♂, 2 ♀; V, 23, 1913, (in dead brush pile), 1 ♀; VI, (F. H. Snow; Wickham), 2 ♂, 11 ♀;[260] VIII, 31, 1912, (Hebard; not scarce in heavy weeds, sunflowers, etc., in openings of river plain jungle scrub), 4 ♂, 6 ♀, entire Brownsville series *type, allotype, paratypes*, [Hebard Cln., Univ. Kansas, A. N. S. P., U. S. N. M. and Davis Cln.].

[259] It is upon these specimens and those from Waco, that Scudder based his "Texas" record of *cincta*.

[260] Upon a specimen of this series Rehn's record of *oblongata* was based, later referred by Caudell to *intercepta*.

Piper Plantation, near Brownsville, Tex., VIII, 3, 1912, (Rehn and Hebard), 1 ♀, *paratype*, [Hebard Cln.].

Esperanza Ranch, near Brownsville, Tex., V, 1904, (C. Schaeffer), 1 ♂, 2 ♀, *paratypes*, [Bklyn. Inst.].

Topo stage station, near Brownsville, Tex., IV, 1904, (C. Schaeffer), 1 ♀,[261] *paratype*, [Bklyn. Inst.].

San Tomas, near Brownsville, Tex., IV, 26, 1904, (C. Schaeffer), 1 ♀, *paratype*, [Bklyn. Inst.].

Rocha Ranch, near Brownsville, Tex., IV, 1904, (C. Schaeffer), 1 ♀, *paratype*, [Bklyn. Inst.].

Saltillo, Coahuila, Mexico, 1 ♀, [Hebard Cln.].

San José, Tamaulipas, Mex., IV, 1910, (Bueno), 1 ♀, [U. S. N. M.].

Subfamily EPILAMPRINAE

The following features are considered diagnostic.—Antennae setaceous, never plumose. Tegmina normally coriaceous or corneous, fully developed or reduced. Wings with costal veins irregular, ulnar vein with incomplete rami. Supra-anal plate weakly to strongly bilobate in both sexes. Subgenital plate of male frequently slightly asymmetrical, rounded, with slender styles set in sockets, the dextral socket being the longer.[262] Femora with ventral margins weakly to heavily armed.

The members of this subfamily are all confined to the tropics. A single species has become established in the Florida Keys.

LEUROLESTES Rehn and Hebard

Blatta, *Nauphoeta*, *Phoetalia* and *Phaetalia* of authors.[263]

1914. *Wattenwyliella* Rehn and Hebard, Ent. News, xxv, p. 217. (May.) [Not of Carl, April, 1914.]

1914. *Leurolestes* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 379. (June.) (New name given for preoccupied *Wattenwyliella*.[264])

The genus contains two circumtropical species.

GENOTYPE: *Leurolestes pallidus* [*N*[*auphoeta*] *pallida*] (Brunner),

[261] Caudell's record of *cincta* is based on this specimen, or one taken with it.

[262] A somewhat similar general type of male subgenital plate is found in many species of the Epilamprinae and Blaberinae.

[263] In the case of *Phoetalia*, *laevigata* of Beauvois was unfortunately designated as genotype, and, in consequence, although the description is of the present genus, that name falls in the synonymy under *Nyctibora*. *Phaetalia* was caused by Shelford's error in spelling.

[264] Preoccupied by *Wattenwyliella* Carl, April, 1914.

selected by Rehn and Hebard, at time their *Wattenwyliella* was proposed.

Generic Characters.[265]—Size medium small for subfamily, form depressed. Pronotum not covering vertex of head; caudal margin feebly convex, truncate. Tegmina and wings fully developed in both sexes, falling slightly short of, or reaching slightly beyond, the abdominal apex. Tegmina broadest meso-distad; scapular field not broad, narrowing decidedly distad; discoidal sectors (the majority of which are formed by branches of the ulnar vein) numerous and feebly radiating, with numerous transverse veinlets. Wings with mediastine vein reaching to near apex and bounding area of costal veins, which is very narrow; costal veins few and irregular; discoidal and median veins connected by numerous transverse veinlets, the former branching irregularly distad; ulnar vein with numerous (about eleven), strongly divergent, incomplete rami and few (about three) complete distal rami; axillary vein with few (two) branches. Supra-anal plate weakly bilobate in both sexes, cerci short. Male subgenital plate showing features comparable to those found in *Blaberus*. Cephalic femora with ventro-cephalic margins armed proximad with a few, short, heavy spines, followed by a row of minute, closely set, piliform spinulae, terminating distad in a single, moderately elongate, heavy spine; other femoral margins supplied with few, scattered, short, moderately stout spines; genicular spines of median and caudal femora only slightly longer than these. Tarsi with first joint bearing disto-ventrad a large pulvillus, succeeding three joints with brief ventral surfaces each fully occupied by a large pulvillus. Caudal metatarsus as long as remaining tarsal joints. Arolium ample, but not extending more than half the distance to apex of the heavy tarsal claws, its distal margin rather strongly angulato-emarginate, with apex rounded.

Leurolestes pallidus (Brunner) (Plate VI, figures 9 and 10.)

1839. *Blatta laevigata* Serville (not of Beauvois, 1805), Hist. Nat. Ins., Orth., p. 98. [Cuba; Martinique.]

[265] Until a general study of the subfamily is made, we do not feel satisfied that some of the features here given, should not be placed instead in the diagnosis of the Epilamprinae.

1865. *Nauphoeta pallida* Brunner, Nouv. Syst. Blatt., p. 286. [Cuba.]
1868. *Nauphoeta marginalis* Walker, Cat. Blatt. Br. Mus., p. 41. [—?]
1904. *Phoetalia pallida* Kirby, Synon. Cat. Orth., i, p. 116. [West Indies; Brazil; Teneriffe, Canary Islands.]
1910. *Phoetalia laevigata* Rehn and Hebard (not *Blatta laevigata* of Beauvois, 1805), Ent. News, xxi, p. 103. [Key Largo, Florida.]
1910. *Phaetalia laevigata* Shelford (not *Blatta laevigata* of Beauvois, 1805), Gen. Ins., Fasc. 101, Blattidae, Epilamprinae, p. 8.
1914. *Wattenwyliella pallida* Rehn and Hebard, Ent. News, xxv, p. 216. (May.)
1914. *Leurolestes pallidus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 379. (June.)

The references and synonymy for the present species are given by Rehn and Hebard in May, 1914, to that date. The generic name there proposed was preoccupied by *Wattenwyliella* Carl, described in April, 1914. The species has, in past literature, been much confused with the extremely different *Nyctibora laevigata* (Beauvois).

Of the North American roaches, this species shows some slight superficial resemblance to *Pycnoscelus surinamensis;* the different form of the pale pronotal borders and numerous generic features of difference, readily distinguish these widely separated forms.

Characters of Male.—(Key West, Florida.) Size rather small for the subfamily. Head with interocular space about two-thirds as wide as the interocellar space; ocelli large and distinct; flattened surfaces of ocellar areas weakly oblique, but with inner margins not raised above plane of flattened face. Maxillary palpi short, fourth joint distinctly shorter than third or fifth and decidedly constricted proximad. Pronotum weakly convex, except laterad where it is strongly declivent; cephalic margin very weakly convex, transverse, rounding broadly into lateral margins, which are weakly convex and strongly divergent caudad, rounding broadly into the caudal margin, which is weakly convex, transverse. Tegmina and wings (normally) slightly exceeding apex of abdomen (venation, pl. VI, fig. 9). Supra-anal plate delicate, produced but transverse, very weakly bilobate. Cerci very short, compact, with (ten) distinct joints, these very brief, tapering to acute apex. Sinistral portion of anal chamber empty, mesad a soft, sub-cylindrical mantle projects distad, with truncate distal margin supplied with a closely set fringe of microscopic chitinous teeth. Dextral portion of anal chamber occupied by a large, convolute chitinous plate. Subgenital plate convex, asymmetrical; free margin very broadly convex from sinistral base to mesal portion of dextral half, there rounding sharply into rather deeply concave emargination at dextral base, within which the margin is subchitinous. Minute, slender, cylindrical styles are situated on this margin at

the inner margins of the cerci, the sinistral very long, the dextral distinctly longer and over half as long as the cercus.

Characters of Female.—(Key West, Florida.) Agrees with male except in the following features. Size distinctly larger. Head with interocular space nearly equal in width to that of interocellar space. Tegmina and wings (normally) falling slightly short of the apex of the abdomen. Supra-anal plate rather delicate, produced but transverse, rather broadly convex but feebly emarginate mesad, thus weakly showing bilobation. Subgenital plate very ample; distal margin in general convex, but broadly flattened at point where cerci project and also mesad.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida...	(18)	15.2–17.3	3.3–3.9	4.9–5.7	12.4–13.6	4.2–4.5
♀						
Key West, Florida...	(26)	18.5–20	4.1–4.3	6.1–6.4	14.8–15.2	4.7–5

Coloration.—Pronotum maroon, individually suffused with blackish to varying degrees; bordered laterad and cephalad with warm buff, two rotundato-angulate lateral invasions of this color extending into the disk on each side and one meso-cephalad. Tegmina translucent dresden brown, prout's brown proximad at humeral trunk, marginal field warm buff. Head marked between the eyes dorsad with warm buff, sometimes there spreading into a band. Abdomen dark, narrowly but conspicuously bordered, individually to varying degrees, with warm buff.

Immature examples of the species are everywhere shagreenous above, and uniform, suffused liver brown in coloration. As in other species of the Blattidae, the insect after moulting, while still very soft, is whitish buff.

The species is known in the United States only from the material recorded below. This is a tropical domiciliary insect and was found at Key West in a pile of old burlap bags, and in cracks under the stands of a fruit store, in company with *Supella supellectilium*, *Blattella germanica*, *Periplaneta americana* and *Holocompsa nitidula*.

Specimens Examined: 53; 18 males, 27 females and 8 immature individuals.

Key Largo, Florida, III, 1898, (C. L. Pollard), 1 ♀, [U. S. N. M.].

Key West, Fla., VIII, 3 to 7, 1912, (Rehn and Hebard), 18 ♂, 26 ♀, 3 juv. ♂, 3 juv. ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

Subfamily BLATTINAE

The following features are considered diagnostic. Head with vertex usually exposed. Ocellar spots rarely absent. Tegmina, when present, usually semicoriaceous. Male subgenital plate rotundato-rectangulate and symmetrical, with a pair of slender styles, of equal length, set in similar sockets on the distal margin. Male concealed genitalia very complex. Subgenital plate of female with meso-distal portion valvular; a transverse, weakly arcuate suture bounding these valves proximad. Femora with ventral margins heavily spined.

The valvular female subgenital plate, with basal suture of valves transverse arcuate, is a distinctive feature, found only in the Blattinae and occurring in all of the species of this subfamily. Shelford,[266] following Brunner, however, was not fully correct in his comments on this character, as a valvular female subgenital plate, though different in structure, is characteristic of the genera *Anaplecta*, *Holocompsa*, *Compsodes* and *Homoeogamia*, members of the Ectobiinae, Corydiinae and Polyphaginae.

We do not, however, conform with Caudell[267] in merging the Psuedomopinae and Blattinae[268] on the ground that they appear to differ in this feature alone. The present subfamily is in our opinion, fully as satisfactory as the others in the Blattidae. In no case can these subfamilies be separated by one or two absolutely diagnostic characters, and we are forced to rely rather upon a general appearance of consanguinity added to a certain usual combination of characters. We can not too strongly emphasize the assertion that subfamilies are artificial groupings to facilitate systematic work, and, as they are such, exceptions must be expected. In fact the laws of organic evolution prohibit the development, within a family like the Blattidae, of subdivisions, such as we term subfamilies, with distinctions clear cut and constant. The species of the Blattidae are too numerous, and far too many primitive types still survive, for this to be possible.

[266] Gen. Ins., Fasc. 109, Orth., Blattidae, Blattinae, p. 1, (1910).

[267] Proc. U. S. Nat. Mus., xliv, p. 600, (1913).

[268] That author states "I have united Periplanetinae with Blattinae." Instead of Periplanetinae, Pseudomopinae was intended, the equivalent of which has been Phyllodromiinae.

EURYCOTIS Stål

1874. *Eurycotis* Stål, Bih. K. Svensk. Vet. Akad. Handl., ii, no. 13, p. 13.

The genus includes numerous West Indian and tropical American species, but one being found in, and peculiar to, the United States.

The present genus is separated from *Pelmatosilpha* by the more reduced organs of flight. Though this feature is valueless, even for specific separation, in many of the forms of the Pseudomopinae, it apparently constitutes a valid diagnostic character in the present instance and is, indeed, usually far more important throughout the Blattinae. Monographic studies, however, must be undertaken before definite conclusions can be reached.

The genus *Eurycotis* divides into several distinctive groups.[269]

GENOTYPE, by original designation: *Eurycotis rufovittata* [*Polyz*[*osteria*] *rufovittata*] (Brunner) = *Eurycotis mysteca* [*P*[*eriplaneta*] *mysteca*] (Saussure).

Generic Characters.—Sexes similar. Width between eyes greater than that between antennal sockets. Pronotum convex, roundly trapezoidal, not covering vertex of head. Tegmina squamiform or quadrate, not extending beyond metanotum and truncate distad. Wings absent, squamiform or greatly reduced. Ventro-cephalic margins of cephalic femora supplied with stout, not very elongate, moderately recurved spines, decreasing slightly in length distad and terminating in three spines, more elongate in increasing ratio distad; ventro-caudal margins supplied with few, stout, elongate spines. Other ventral femoral margins supplied with numerous, stout, elongate spines; those of the caudal margins distinctly the longer. External tibial spines tri-seriately arranged. Tarsal joints heavy; metatarsi supplied ventrad with an elongate distal pulvillus, succeding three joints each with ventral surface occupied by a large pulvillus. Arolia ample, with dorsal surfaces chitinous, distal margins feebly convex, truncate.

[269] Kirby, misunderstanding the degree of tegminal reduction used to separate *Eurycotis* from *Pelmatosilpha*, incorrectly transfers *opaca* (Brunner) and *floridana* (Walker) to the latter genus. Syst. Cat. Orth., i, p. 143, (1904).

Eurycotis floridana (Walker) (Plate VI, figures 11 to 14.)

1868. *Periplaneta floridana* Walker, Cat. Blatt. Br. Mus., p. 135. [♀: St. John's Bluff, east Florida; North America.] (Pronotum with pale lateral margins, adult.)

1868. *Periplaneta semipicta* Walker, ibid., p. 141. [♂; St. John's Bluff, east Florida.] (With pale lateral bands, immature.)

1877. *Platyzosteria ingens* Scudder, Proc. Bost. Soc. Nat. Hist., xix, p. 92. [3 ♂, 1 ♀; Fort Reed, Florida.] (Unicolorous blackish red-brown adults.)

1877. *Platyzosteria sabalianus* Scudder, ibid., p. 93. [2 ♂; Sanford, Florida.] (With pale lateral bands, immature.)

The above synonymy has already been fully established. Misconception of the value of presence or absence of pale lateral markings in the present species, and error in supposing immature examples to be adult, caused most of the confusion. Scudder, however, was even more at fault, as Walker's names were evidently ignored, while his comparisions at Vienna with Brunner's "types of *opaca*" show an additional error.[270]

The present species belongs to the second portion of the genus, which includes the large and heavy species. In linear position, it follows the distinctive *E. tibialis* and is succeded by *E. opaca*, to which species it is very closely related.

The differences from *opaca*[271] may be summed up as follows. Size averaging smaller, form less robust and surface less roughened. Coloration not as nearly solid black.[272]

This insect shows quite decided size variation, irrespective of geographic influences. In the instars preceding maturity, from about half grown to the last, the pronotum, mesonotum and metanotum are often conspicuously marked laterad with broad pale yellowish bands; these are rarely weakly indicated, never pronounced,

[270] The species was described from a single specimen in the Dohrn Collection at Stettin.

[271] 1865. *P[olyzosteria] opaca* Brunner, Nouv. Syst. Blatt, p. 216. [♂, Cuba.]

The comparisons here made are based upon the following material, besides the two adventive females recorded on page 267.

San Diego de los Baños, Pinar del Rio, Cuba, IV, 22, 1900, (Palmer and Riley), 1 juv. ♀, [U. S. N. M.]. (Incorrectly recorded as *E. floridana* by Rehn, in 1909.)

Sancti Spiritus, Santa Clara, Cuba, IV, 1904, (H. A. Pilsbry), 1 ♀, [A. N. S. P.].

Varadero, north coast of Cuba, (J. W. Ross), 1 ♂, [A. N. S. P.].

[272] Additional Cuban material will probably make clear other diagnostic features. The material before us, though showing in every case a distinctly different facies from that developed in *floridana*, is not sufficient to determine whether or not certain features of possible difference are ascribable to individual variation.

in the adult condition over this region. In this material the general coloration is rich blackish red-brown.

Characters of Male.—(Miami, Florida.) Head large, eyes widely separated, vertex rounding evenly into face, which is weakly convex, vertex with three weakly defined, perpendicular sutures, these often obsolete, pale ocellar spots usually suffused, a larger pale spot usually present below the antennal sockets on the genae. Maxillary palpi small; fourth joint distinctly shorter than third, fifth (distal) joint distinctly shorter than fourth. Dorsal surface polished; pronotum and metanotum microscopically punctulate, tegmina cribroso-punctulate, abdomen weakly punctulate becoming shagreenous distad. Pronotum not strongly convex, this convexity slightly the greatest medio-longitudinally; cephalic margin very weakly convex, with surface there also weakly convex ventrad, rounding evenly into lateral margins, which are moderately convex and divergent to caudal angles, which are moderately sharply rounded, the lateral and caudal margins there forming an angle appreciably less than a right-angle; caudal margin very weakly convex, nearly straight. Tegmina subquadrate, extending just beyond caudal margin of mesonotum; the sutural margins slightly overlapping, or separated by a space of over 2 mm.; costal and sutural margins very weakly convex and subparallel, the former cingulate; distal margin transverse, truncate, occasionally briefly, weakly and roundly produced at the external angles. Wings absent. Latero-caudal angles of fourth to sixth dorsal abdominal segments produced, in increasing ratio caudad, in slender, sharp, elongate teeth. Supra-anal plate decidedly transverse; lateral margins weakly converging distad, distal margin broadly obtuse-angulate emarginate and decidedly hairy, margin of plate, at rather sharply rounded latero-caudal angles, supplied with microscopic, stout, sharp spines; ventral surface of plate thickly studded with such spines. Cerci rather short, with (about ten) weakly defined joints, tapering distad to acute apex; dorsal surface deplanate, ventral surface convex, with lateral margins very narrowly and weakly flattened. Genital hook situated sinistro-ventrad in anal chamber, an elongate, slender, flattened, chitinous process which projects caudad, proximad it is horizontally flattened, distad obliquely flattened, there directed dextrad, narrowing and curving toward the apex which is enlarged, flattened, with distal portion feebly produced, convex in outline except ventral margin which is straight, the apex at this margin narrowly produced in a sharp projection. The anal chamber is filled proximad with a complexity of lobiform processes, in large part chitinous, from which project mesad two short, sharp, chitinous spikes and a single subchitinous, slightly longer process curved dorsad; dextrad of these an elongate, slender, chitinous process, as long as the genital hook, tapers and curves gently dextrad to its aciculate apex. Subgenital plate transverse, strongly emarginate meso-laterad, at which points on the margin, in soft sockets, are situated symmetrical, rather stout, very elongate styles, which taper evenly to their acute apices, mesal half of plate produced with margin broadly convex. Limbs and armament of same as given in generic description.

Characters of Female.—(Miami, Florida.) Agrees with male in ambisexual characters, differing in the following features. Supra-anal plate more produced; lateral

nverging to mesal portion, which is roundly emarginate and not nearly
s in male. Subgenital plate of the normal valvular Blattinid type;[273]
s of lateral margins, at transverse basal suture of valves, briefly acute-
roduced.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia	Length of caudal tarsal joints
Miami, Florida	31	9.6	13.2	6.7	7.7	11	7.7
Miami, Florida	35	10.4	15.2	7.3	8.7	12.4	8.6
♀							
Billy's Island, Georgia	35	11	15.3	7.8	8.9	12.5	8
Miami, Florida	30	9.3	13.9	7.7	8.2	11	7.8
Key West, Florida	31.5	10.1	14.2	7.3	8.5	11.9	7.7
Key West, Florida	39.5	11.8	16.4	8.2	9.3	14.3	9.2

In the entire series before us, t length of the caudal tarsal joints is contained in the caudal a from 1.41 to 1.65 times.

Coloration.—General coloration blackish, tinged with claret brown (intensive), varying to blackish claret brown, this paler on pronotum, mesonotum and metanotum (recessive). The pronotum is usually immaculate, but sometimes shows traces of lateral paler bands; occasional specimens have a small area there of buffy, tinged with claret brown, while rare specimens have broad lateral bands of ochraceous-orange, tinged laterad with morocco red, this banding again indicated, but not as heavily, in the marginal field of the tegmina and laterad on the metanotum. In specimens of recessive coloration, the head is morocco red, the ocellar areas, face below the antennal sockets and clypeus, ochraceous-buff. The exposed ventral portions of pronotum, mesonotum and metanotum, ventral surface of thoracic segments and coxae, ochraceous-buff, the coxae lined proximad with deep claret brown. The femora morocco red, the tibiae and tarsi deep claret brown, the pulvilli buffy. The ventral surface of abdomen, of general coloration. In the maximum intensive condition, the clypeus and small areas on the ventral surface of the pronotum, mesonotum and metanotum and on the coxae, alone are buffy.

[273] These valves are not completely separated. An expansive integument joins their inner margins; upon this the ootheca rests when partly extruded, the valves gripping its sides.

In the immature condition, to the last instars preceding maturity, the pronotum, mesonotum and metanotum are very often strikingly and broadly margined laterad with buffy. Immature examples as immaculate as the normal adult are rare, except in the earliest instars. Every degree of variation, from the uniform, to the banded type, is represented in the series before us.

The known distribution of the present species is defined by the records given below. These roaches are found in almost every out-door sheltered position, under bark of dead trees, in stumps, under signs and in cavities in the limestone rock of southern Florida and the Florida Keys. Adults only, of both sexes, when alarmed are able to emit a greasy liquid of a most repellent odor, this odor strongly suggesting that of the Hemipteron, *Brochymena annulata* (Fabricius).

Specimens Examined: 86; 18 males, 23 females and 45 immature individuals.

St. Simon's Island, Georgia, VIII, 30, 1911, (Rehn and Hebard; in cavity of live oak, *Quercus virginiana*), 1 ♂, 1 ♀, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Billy's Island, Okeefenokee Swamp, Ga., IX, 1 to 5, 1913, (J. C. Bradley), 1 ♀, [Hebard Cln.].

Jacksonville, Florida, (W. T. Davis; in log), 1 juv. ♀, [Hebard Cln.].

Ortega, Fla., IX, 6, 1913, (W. T. Davis), 1 juv. ♂, [Hebard Cln.].

Green Cove Springs, Fla., (Boardman), 1 ♀, [M. C. Z.].

Levy County, Fla., III, (P. Laurent), 1 ♂, 1 juv. ♂, [Hebard Cln.].

Cedar Keys, Fla., VIII, 15, 1905, (Rehn and Hebard; under bark of pine log), 2 ♀, [A. N. S. P. and Hebard Cln.].

Tampa, Fla., I, 16, 1904, (Hebard; under bark), 1 ♂, 2 ♀, 3 juv. ♂, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

Lakeland, Fla., XI, 8, 1911, (W. T. Davis), 1 juv. ♀, [Hebard Cln.].

Inverness, Fla., 1892, (C. M. Weed), 1 juv. ♂, [Hebard Cln.].

Punta Gorda, Fla., XI, 11, 1911, (W. T. Davis; climbing about on top of goldenrod at night), 1 ♂, [A. N. S. P.].

Useppa Island, Charlotte Harbor, Fla., V, 17 to 19, 1915, (Hebard; on ground, in heavy tangle, after dark), 1 ♀, [Hebard Cln.].

Everglade, Fla., IV, 9, 1912, (W. T. Davis), 1 ♂, [Hebard Cln.].

Sanford, Fla., IV, 6, 1875, (top of cabbage palmetto), 1 juv. ♂, *type* of *Platyzosteria sabalianus* Scudder, [M. C. Z.].

Fort Lauderdale, Fla., III, 1, 1916, (Hebard; juv. occasional under signs on *Pinus caraibea*), 1 juv. ♀, [Hebard Cln.].

Ojus, Fla., II, 29, 1916, (Hebard; few adults, juv. occasional under signs on *Pinus caraibea*), 1 ♂, [Hebard Cln.].

Miami, Fla., II, 28, 1916, (Hebard; few adults, juv. occasional under signs on *Pinus caraibea*), 1 ♂, 1 juv. ♀, 1 small juv.; III, 4, 1916, (Hebard; Musa Isle,

in decaying log of *Sabal palmetto*), 1 ♂; III, 4 to 16, 1915, (Hebard; Brickell's Hammock, trapped, molasses jar, numerous), 1 ♂, 2 ♀, 1 juv. ♂, 2 small juv.; VI, 28, 1899, (H. A. Pilsbry), 1 ♀, [all Hebard Cln. and A. N. S. P.].

Snapper Creek Hammock, Dade County, Fla., II, 29, 1916, (Hebard; few juv. in epiphytic bromeliads, *Tillandsia fasciculata*, on *Quercus virginiana*, on edge of hammock), 1 juv. ♂, [Hebard Cln.].

Homestead, Fla., III, 28, 1910, (Hebard; under bark of pine logs), 1 juv. ♂, 2 small juv.; VII, 10 to 12, 1912, (Rehn and Hebard; one, at night, on pine trunk), 1 ♂, 1 ♀, 1 small juv., [Hebard Cln. and A. N. S. P.].

Detroit, Fla., VII, 12, 1912, (Rehn and Hebard; in epiphyte, *Tillandsia fasciculata*, on *Quercus virginiana*), 1 juv. ♂, [Hebard Cln.].

Royal Palm Key, Fla., III, 3, 1917, (Hebard; common under bark and debris in jungle), 1 ♂, 1 ♀, 1 juv., [Hebard Cln.].

Long Key, Fla., III, 13, 1910, (Hebard; under the dry fibers at the base of the heads of cocoanut palms), 4 juv. ♂, 2 juv. ♀, 3 small juv., [Hebard Cln. and A. N. S. P.].

Key West, Fla., I, 18 and 19, 1904, (Hebard; very numerous under limestone boulders in keys scrub), 1 ♂, 2 ♀; III, 15 and 16, 1910, (Hebard; under boards and limestone boulders), 1 ♂, 7 ♀, 1 juv. ♂, 1 juv. ♀, 7 small juv.; VII, 3 to 7, 1912, (Rehn and Hebard; one, at night, climbing in weeds), 2 juv. ♂, [Hebard Cln. and A. N. S. P.].

Warrington, Fla., VIII, 4, 1903, (A. P. Morse), 4 ♂, 1 ♀, [Morse Cln.].

Biloxi, Mississippi, III, 15, (F. M. Jones), 1 ♂, [A. N. S. P.].

NEOSTYLOPYGA Shelford

1911. *Neostylopyga* Shelford, Ent. Rec., xxiii, p. 242.

The numerous species of the present genus are tropical in distribution, the majority being found in Africa and the far East.

GENOTYPE, by original designation: *Neostylopyga rhombifolia* [[*Blatta*] *rhombifolia*] (Stoll).

Generic Characters.—Sexes similar. Tegmina reduced to lateral, squamiform lobes; wings absent. Fifth[274] dorsal abdominal segment unmodified, not enlarged or declivent.[275] External tibial spines tri-seriately arranged. Tarsi with small distal pulvilli, the pulvillus of the fourth (smallest) joint not entirely occupying its ventral surface. Caudal metatarsus longer than the succeeding joints. Arolia moderately large, truncate distad.

[274] Shelford, in the Genera Insectorum, has given "sixth" dorsal abdominal segment, due to the fact that he counted the median segment as the first.

[275] An enlarged and declivent type of this segment is characteristic of females of the Old World genus *Pseudoderopeltis*.

Neostylopyga rhombifolia (Stoll) (Plate VI, figure 15.)

1813. [*Blatta*] *rhombifolia* Stoll, Natuur. Afbeeld. Beschr. Spoken etc., Kakkerlakken, p. 5, register p. 14, pl. IIId, fig. 13. [Apparently an immature female; no locality given.]

Stoll's figure shows plainly the distinctive color pattern of the species. The established synonyms are *Periplaneta histrio* Saussure, *Periplaneta decorata* Brunner and *Polyzosteria heterospila* Walker.

This is a large roach, shining brownish black in general coloration, beautifully marbled with yellowish-buff (pl. VI, fig. 15). The color pattern and brief lateral tegminal pads readily distinguish the insect from any other species found in the regions under consideration.

Characters of Male.—(Moschi, Kilimanjaro, East Africa.[276]) Size moderately large, form stout. Head much as in *Periplaneta americana*, but with ocellar areas forming a slightly less obtuse angulation with the interocellar area, ocellar spots very weakly indicated. Pronotum weakly convex, yet showing extensive but weak lateral and meso-caudal flattening; margin above head straight, transverse, thence convex divergent to latero-caudal angles, which are rectangulate and sharply rounded; caudal margins of pronotum, mesonotum and metanotum, straight, transverse. Tegmina small, lateral pads, extending to slightly beyond caudal margin of mesonotum; surface shining, minutely punctulate, with humeral trunk alone distinct; costal and sutural margins subparallel, each showing a faint convexity, distal margin rounded with apex nearer the costal margin. Wings absent. Dorsal surface of abdomen unspecialized, latero-caudal angles of segments briefly acute-angulate produced caudad, the degree of production slightly increasing caudad. Supra-anal plate chitinous only in very narrow proximal portion, remaining produced portion formed by a delicate whitish integument with free margin convex except mesad, where a deep acute-angulate emargination, with straight, convergent sides, extends fully half the distance to the base of the delicate portion.[277] Subgenital plate small, free margin briefly convex, transverse to base of styles, between these broadly convexo-truncate. Styles symmetrical, very elongate, slender, cylindrical processes, slightly longer than length of subgenital plate, set in sockets on free margin of the plate at lateral bases of the slightly produced mesal portion. Limbs elongate and slender. Cephalic femora with ventro-cephalic margins armed with a row of heavy and moderately elongate spines, terminating distad in three

[276] The exotic series before us, of some forty specimens, shows a very decided preponderance of females. Though several immature males are included, this is the only adult of the sex available.

[277] The texture and form of this delicate integument shows a general similarity to that found in males of *Periplaneta americana*, though in that species both production and emargination are much more decided.

longer [illegible]es, in strongly increasing length ratio, few spines on ventro-caudal mar- [illegible]an and caudal femora furnished with a single, long, genicular spine and v[illegible]ral margins supplied with heavy, elongate spines. Arolia present.

[illegible]ters of Female.—(Nogales, Arizona.) Agrees with male except in following features. Size large, form stouter. Head and pronotum in consequence proportionately broader. Supra-anal plate strongly tectate, with a medio-longitudinal ridge; lateral margins straight, convergent to deep median angulate-emargination, with straight sides, distal apices of plate acute. Subgenital plate as typical for the Blattinae.

Measurements in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia
Moschi, Kilimanjaro, East Africa	20.4	6.4	9	3.8	3.3	8.7
♀						
Nogales, Arizona	25.3	7	9.6	4.2	3.4	9.2

Other exotic females before us are 20 to 27 mm. in length.

The complex color pattern is [illegible]wn by the figure here given. The dark brownish black co[illegible] is ti[illegible]ged with claret brown on the tegmina, mesal portion of d[illegible]rface of abdomen and on the limbs. The extensive dark mesal portion of the ventral surface of the abdomen is a rich claret brown.

This insect is generally distributed throughout the warmer regions of the earth; it is probably domiciliary, with habits very similar to those of *Periplaneta americana*.

In the United States the species has apparently gained a foothold only at Nogales, Arizona, on the Mexican boundary. It has probably been long established in western Mexico and has been recorded from there by Saussure, from Acapulco by Brunner, while a good series from tropical western North America is now before us.[278]

Specimens Examined: 1; 1 female.

Nogales, Arizona, VI, 14, 1903, (E. J. Oslar), 1 ♀, [U. S. N. M.].

[278] Sierra el Tosti, Lower California, Mexico, X, 1893, 2 ♀, [Hebard Cln.].

San José del Cabo, L. Cal., Mex., 8 ♀, 1 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. M. N. H.].

Escuinapa, Sinaloa, Mex., (J. H. Batty), 1 small juv. ♂, [A. M. N. H.].

BLATTA Linnaeus

1758. *Blatta* Linnaeus, Syst. Nat., Ed. X, i, p. 424.
1825. *Kakerlac* Latreille, Fam. Nat. Regne Anim., p. 411.
1833. *Steleopyga* Fischer, Bull. Soc. Nat. Moscou, vi, p. 356.
1846. *Stylopyga* Fischer, Ent. Ross., Orth., p. 68. (Emendation for *Steleopyga*.)

The genus includes numerous species, the majority of which are tropical in distribution.

GENOTYPE: *Blatta orientalis* Linnaeus, subsequently indicated by Latreille in 1807.[279]

Generic Characters.—Sexes dissimilar. Antennae elongate, setaceous. Pronotum roundly trapezoidal, not covering vertex of head. Tegmina and wings of male variable, not attaining the apex of the abdomen. Tegmina of female, in the majority of species, squamiform or quadrate[280]; wings absent, vestigial or greatly reduced.[281] Ventro-cephalic margins of cephalic femora supplied with few, stout, not very elongate, slightly recurved spines, decreasing slightly in length distad and followed by a series of slightly shorter spines, terminating in three elongate spines in increasing length ratio distad. Other femoral margins supplied with numerous stout, elongate, straight spines; those on the caudal margins distinctly the longer. External tibial spines tri-seriately arranged. Tarsi elongate, caudal metatarsus longer than succeeding joints. First four tarsal joints each supplied with a small distal pulvillus. Arolia absent.

Blatta orientalis Linnaeus. (Plate VII, figures 1 and 2.)

1758. [*Blatta*] *orientalis* Linnaeus, Syst. Nat., Ed. X, i, p. 424. [America; the East; Russia; Stockholm, Sweden; Finland.]

The established synonyms of the species are *Blatta culinaris* De Geer, *Blatta ferrugineofusca* Gronov and *Blatta badia* Saussure.

[279] Gen. Crustac. et Ins., iii, p. 83.

[280] In one species before us, *agaboides* (Gerstaecker), the tegmina and wings vary from decidedly reduced, to fully developed, in both sexes. This is unusual in the Blattinae, the vast majority of species showing far less individual variation in the organs of flight than is shown by numerous species of the Pseudomopinae.

[281] In females of the species having the usual type of squamiform tegmina, the wings are absent.

nternal structure of this insect has been extensively stud[282]

is a medium large, blackish brown insect, the males of w[illegible] ave the tegmina falling short of the apex of the abdomen, while in the females these organs are represented by small, ovate-lanceolate, lateral pads.

Characters of Male.—(Chestnut Hill, Pennsylvania.) Size medium large, form moderately stout. Head much as in *Periplaneta americana* (ocellar area forming a slightly less obtuse angulation with the interocellar area than in that species), broad; interocular space wide, slightly greater than the interantennal space; surface of ocellar area weakly concave, ocelli distinct; maxillary palpi moderately elongate. Pronotum nearly oval, but with greatest width meso-caudal; weakly convex, with disk weakly deplanate latero-caudad. Tegmina covering about two-thirds of abdomen, strongly overlapping. Wings reaching as far as tegminal apices. Supra-anal plate transverse, subrectangulate produced, lateral margins weakly concave to sharp, subrectangulate angle formed with distal margin, which is very weakly concave, the plate at this margin becoming subchitinous, particularly mesad. Cerci deplanate dorsad; lateral margins feebly crenate, converging distad to the acute apex. Within the anal chamber sinistrad, a flattened, chitinous shaft extends caudad, narrowing to its least width at base of distal portion; this portion bent dorsad, flattened, broad, tapering to the sharply rounded apex, with a small proximo-sinistral thorn, curving inward. The chamber is nearly filled with chitinous plates which converge mesad, from between which a paired, aciculate, chitinous projection is directed sinistrad, and a recurved, slender, chitinous spine is directed caudad.[283] Subgenital plate transverse, convex to distal margin, where it is narrowly concave; lateral margins brief, weakly convex produced to the distinct style sockets, distal margin between these broadly convex.[284] Styles set in sockets on the free margin at the latero-caudal angles, very slender, cylindrical processes of equal length and thickness, each as long as distance from socket to base of subgenital plate. Limbs and armament of same as given in generic description. No arolia present.

[282] A full bibliography of such work is given by Bordas in his "Recherches anatomiques histologiques et physiologiques sur les organes appendiculaires de l'appareil reproducteur femelle des Blattes (*Periplaneta orientalis* L.)." Ann. Sci. Nat., 9 serié, Zool., ix, p. 71 to 121, (1909).

[283] The other plates and projections being likewise movable, but more liable to assume different positions when drying, we find that, in dried material, their significant angles and projections are frequently concealed. Examination of living material would be necessary to determine their normal position, while, to determine their form in dried material, elaborate and destructive dissections would be imperative.

In the Blattinae these organs would undoubtedly be found most interesting in structure and of diagnostic value, their general character probably being of decided generic diagnostic value, but, in cases where species can be differentiated without this aid, the genital hook should best alone be considered.

[284] This convexity sometimes shows a feebly angulate condition.

Characters of Female.—(Chestnut Hill, Pennsylvania.) Agrees with male except in the following features. Form decidedly stout. Head slightly broader, interocular space wider and distinctly greater than interantennal space, ocelli represented by small spots. Pronotum larger, evenly convex, with greatest width near caudal margin, which is straight transverse.[285] Tegmina small, ovate-lanceolate, lateral pads, reaching only slightly beyond mesal portion of metanotum. Wings absent. Supra-anal plate strongly tectate, with a medio-longitudinal ridge; subtriangular in outline, with lateral margins weakly convex and apex decidedly angulate-emarginate. Cerci slightly stouter, with lateral margins scarcely crenate. Subgenital plate valvular, as typical for the Blattinae (see pl. vii. fig. 9).

Measurements (in millimeters)

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Chestnut Hill, Pennsylvania.						
♂	(21)	20–24	5.7–6.3	7.1–7.9	11.9–16.7	5–6.7
♀	(23)	18–23	6.1–7.1	8.2–9.6	4.8–6.8	2.8–4.2

These extremes are not exceeded by any of the other specimens before us and are evidently due to individual variation.

Coloration.—♂. General color shining blackish chestnut brown, limbs chestnut to sanford's brown, ventral surface of abdomen becoming burnt sienna mesad. Ocelli buffy.

♀. General color shining blackish brown with a faint chestnut tinge, this more pronounced on the limbs. Ocellar spots buffy. Rarely paler females occur, approximating the normal general coloration of the males, while a few males before us are as dark as the normal females.

Ootheca large, carried with suture dorsad; lateral surfaces convex, microscopically shagreenous, with feeble depressions indicated toward the suture, which define the egg sacks within; ventral margin weakly convex, sutural margin weakly concave. Suture high, delicate, transparent, with linear, oblique divisions showing laterad; above showing a series of ridges, which form a succession of horseshoe-shaped links, these feebly ascending caudad, with caudal margins, in consequence, briefly perpendicular.

[285] Throughout the Blattidae reduction in the organs of flight is accompanied by a broadening of the pronotum, its point of greatest width moving caudad and the caudal margin becoming increasingly transverse. These features develop in absolutely proportionate ratio, and recognition of this fact is of great importance to the systematist.

This cosmopolitan, domiciliary pest has been spread by commerce over all but the most northern portions of the United States. It has been recorded in Canada only from Toronto and Sarnia, Ontario. As is the case with *Blattella germanica*, its greatest abundance on this Continent appears to be reached in the central latitudes of the United States. In infested houses about Philadelphia it appears in swarms during the month of May, coincident with the arrival of the shad in the Delaware River, and in consequence is locally known as the Shad Roach.

Specimens Examined: 101; 48 males, 45 females and 8 immature individuals.

New Haven, Connecticut, 1 ♀, [A. N. S. P.].

Camden, New Jersey, VII, 17, 1904, (G. M. Greene), 1 ♀, [A. N. S. P.].

Philadelphia, Pennsylvania, V, 4 to VI, 20, 1896 and 1914, (majority E. R. Casey), 7 ♂, 8 ♀, 1 juv. ♂, 1 juv. ♀, [A. N. S. P.].

Chestnut Hill, Pa., V, 3 to 10, 1914, (Hebard; in kitchen), 21 ♂, 23 ♀, 1 juv. ♂, [Hebard Cln.].

Harrisburg, Pa., VI, 10 to VII, 6, (at light), 5 ♂, 25 ♀, [Pa. State Dept. Zool. Cln.]; X, 14, 1916, (E. Daecke), 1 ♀ with ootheca, [Daecke Cln.].

Erie, Pa., 1 ♂, 1 juv. ♀, [Pa. State Dept. Zool. Cln.].

Raleigh, North Carolina, VI, 4 to middle of VIII, (Brimley; Foster), 2 ♂, 2 ♀, [Brimley and Cornell Univ. Clns.].

Southern Pines, N. C., VII, 5 and 9, 1915, (A. H. Manee), 2 ♀, [Hebard Cln.].

Johnson City, Tennessee, VIII, 27, 1903, (A. P. Morse), 3 juv. ♂, [Morse Cln.].

Decatur, Alabama, (B. Shimek), 3 ♂, [Hebard Cln.].

Madison, Wisconsin, VI, 16 to VII, 9, 3 ♂, 3 ♀, [Wisc. Agr. Exp. Sta. Cln.].

St. Anthony Park, Minnesota, IV, 2, 1896, 1 juv. ♂, [Hebard Cln.].

Iowa City, Iowa, IX, 24 and XI, 19, 1908 and 1915, (M. P. Somes), 1 ♂, 1 ♀, [Somes Cln.].

Hamburg, Ia., IX, 5, 1914, (M. P. Somes), 1 juv. ♂, [Somes Cln.].

Mountain Grove, Missouri, VIII, 14, 1916, (for Somes), 1 ♂, [Somes Cln.].

Lincoln, Nebraska, VI and VIII, (♂ at light), 1 ♂, 1 ♀, [Hebard Cln.].

Denver, Colorado, III, 21, (Beale), 1 ♀, [Hebard Cln.].

Denton, Texas, V, 28, 1906, (F. C. Bishopp), 1 ♂, [U. S. N. M.].

Marathon, Tex., 3940 feet, VIII, 26, 1912, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Alamogordo, New Mexico, (von Krockow), 2 ♂, [A. M. N. H.].

Grand Canyon, Arizona, 1 ♂, [Bklyn. Inst.].

Prescott, Ariz., VII, 14, 1904, (R. E. Kunzé), 1 ♂, 1 ♀, [Hebard Cln.].

Nogales, Ariz., VI, 20, 1903, (E. J. Oslar), 1 ♂, [U. S. N. M.].

Redlands, California, I, 20, 1899, 2 ♂, [U. S. N. M.].

Los Angeles, Cal., VII, 1886, 1 ♂, [Hebard Cln.].

PERIPLANETA Burmeister

1838. *Periplaneta* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 502.
1864. *Cacerlaca* Saussure, Mém. Hist. Nat. Mex., Orth., p. 69.

The present genus includes numerous species, three of which are generally distributed over the warmer regions of the Earth; these three were included with the original description, two others there given being later placed in other genera. The genus shows its greatest specific numerical abundance in Asiatic and African regions.

GENOTYPE: *Periplaneta americana* [*Blatta americana*] (Linnaeus), selected by Kirby in 1890.[286]

Generic Characters.—Sexes similar. Antennae very long and slender. Pronotum convex, deflexed laterad, roundly trapezoidal, not covering vertex of head. Latero-caudal angles of mesonotum and metanotum not produced as slender, membranous processes.[287] Tegmina coriaceous, usually extending beyond the apex of the abdomen;[288] veins of discoidal and scapular fields, excepting the heavy humeral trunk, equally distinct and frequently branching, the whole radiating and with division between the discoidal and scapular fields not defined beyond the middle portion of the tegmen. Wings with anterior field semi-coriaceous; area of costal veins moderately broad, with costal veins frequently forking; median vein obsolete proximad; ulnar vein with few, brief, irregular, incomplete rami proximad, forking into many complete distal rami, most of which show subsequent furcation; axillary vein with numerous straight rami. Cerci elongate. Male subgenital plate symmetrical, with similar, elongate, slender styles, situated in symmetrical sockets latero-distad. Limbs elongate and slender. Cephalic femora with ventro-cephalic margins armed with a row of heavy, moderately elongate spines, which are slightly longest meso-proximad and are terminated distad by three spines, more elongate in increasing ratio distad; other ventral femoral margins supplied with heavy, elongate spines, these least numerous on the caudal

[286] Sci. Proc. R. Dublin Soc., vi, p. 562.

[287] Such productions are diagnostic for males of the genus *Pseudoderopeltis*, which are otherwise similar to males of *Periplaneta;* the females of that genus, however, show very great differences from the opposite sex.

[288] The tegmina are usually slightly longer in males than in females.

the cephalic femora and showing the greatest length
idal margins of the median and caudal femora. Ex-
al spines tri-seriately arranged. Tarsi very elongate;
oints each supplied with a small distal pulvillus. Arolia
icate distad.

a americana (Linnaeus) (Plate VII, figures 3 to 11.)

[Blatta] *americana* Linnaeus, Syst. Nat., Ed. X, p. 424. [America.]

ta kakkerlac DeGeer, Mem. l'Hist. Ins., iii, p. 535, pl. 44, figs. 1, 2 (♂), 3 (♀). [Meridional South America, [Surinam].]

1901. *Periplaneta americana colorata* Rehn, Trans. Am. Ent. Soc., xxvii, p. 220. [♀ (nec ♂), Cuernavaca, Morelos, Mexico.]

DeGeer admittedly gave the nam *kakkerlac* to the species described by Linnaeus as *americana*. elford has shown[289] that the types of *americana* and other species collected by Rolander and described by Linnaeus, probably be nged to DeGeer, and were subsequently again described by t it author. Thus we may safely assume that, though Linnaeu description of *americana* is extremely unsatisfactory, the characters described and shown in the figures of the synonymous *kakker* by DeGeer, fix the species' identity beyond doubt.

The specimen described as *americana colorata* by Rehn, is before us. It is clearly a mere color variant, with marginal caudal band of pronotum as normal in *P. brunnea*, and is not worthy of name recognition.

The established synonyms of the present species are *Blatta kakkerlac* DeGeer, *Blatta aurelianensis* Fourcr., *Blatta siccifolia* and *aurantiaca* Stoll, *Periplaneta stolida* Walker and *Periplaneta americana* variety *colorata* Rehn.

This is a large, shining, reddish brown insect, with paler pronotum showing two large, but weakly defined, spots meso-cephalad and a marginal suffusion caudad of the general darker coloration. It is the largest of the North American species of the genus, having the most decidedly caudate organs of flight, agreeing rather closely in coloration with *brunnea*, but normally with pronotum showing the paired meso-cephalic blotches more decided and the marginal caudal band and lateral suffusion less intense. In both species,

[289] Trans. Ent. Soc. London, 1907, p. 456, (1908).

however, decided color variation occurs and occasionally size variation makes it necessary to examine material carefully before definitely correct determinations can be given for females. The two other North American species of the genus, *australasiae* and *fuliginosa*, show distinctive features, not only of structure, but of coloration as well.

Characters of Male.—(Yuma, Arizona.) Size large, form stout. Head elongate;[290] interocular space narrow, less than one millimeter in width, interocellar area forming an obtuse angle with ocellar areas; ocelli pale and distinct. Pronotum weakly convex, the convexity more decided narrowly laterad, disk with broad but shallow oblique sulci; margin above head transverse, thence lateral margins are divergent and weakly convex to slightly beyond mesal point, thence weakly convergent and convex to caudal angles, caudal margin broadly convex; all angles very broadly rounded. Tegmina and wings elongate and fully developed. Dorsal surface of abdomen unspecialized, with latero-caudal angles not produced and bluntly rounded. Supra-anal plate entirely subchitinous, represented by a hyaline mantle which extends for half its length beyond the subgenital plate, lateral margins weakly convergent and weakly convex to an acute angulate median emargination, which extends about one-third the distance to the base of the plate, apices of extremities thus formed rounded. Styles very elongate and tapering to very slender apices. Sinistrad within the anal chamber, an elongate, stout, chitinous arm extends caudad, with apex acute and curved dorsad and bearing on its distal face a minute, narrow, subchitinous flange; dorsad, just before the distal extremity, another short, acute projection occurs, directed distad. Above this arm a partially chitinous projection, of equal length, is directed dextrad, with swollen, transverse, chitinous apex giving it the form of a rounded T. Dextrad within the anal chamber, cephalad of a rounded, chitinous lobe, project dorsad two processes, directed sinistrad, which are connected at their bases, these taper evenly to their aciculate apices, with dorsal margin of dorsal process sharply serrate. At the base of this organ and hidden by the lobe, are very complex, convolute, soft processes with a slender, curved, chitinous process wound about their base. Subgenital plate small, transverse, free margin moderately convex to style sockets, between these broadly transverse; styles symmetrical, very elongate, slender, cylindrical processes, over twice the length of the subgenital plate. Limbs elongate and slender.

Characters of Female.—(Decatur, Alabama.) Agrees with male except in the following features. Form stouter. Head and pronotum in consequence proportionately broader, interocular space nearly two millimeters wide. Ocellar area not as strongly defined, but ocelli equally distinct. Pronotum much more evenly convex, with discal sulci subobsolete. Tegmina and wings less elongate, extending to apices of cerci. Supra-anal plate weakly tectate, entirely chitinous, lateral

[290] The head is found to be decidedly shorter in some individuals, in such being much nearer the normal type found in *P. brunnea*.

margins convergent and weakly convex to an acute-angulate median emargination, which extends nearly half the distance to base of plate. Subgenital plate as typical for the Blattinae (pl. VII, fig. 9).

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Philadelphia, Pennsylvania	29.7	7.6	9.1	29.6	9.2	6.4	11.9
Thomasville, Georgia	30.2	8.2	9.8	31.1	9.9	7	13.4
Thomasville, Georgia	34.2	9.6	11.3	35.6	11.1	7.1	15.7
Big Pine Key, Florida	29.3	8.2	10.3	30.2	9.8	6.7	12.8
Big Pine Key, Florida	33.3	9.3	11.3	35.4	10.4	7	15.9
Yuma, Arizona	32.2	8.4	10.2	30.4	9.4	6.3	13.2
♀							
Philadelphia, Pennsylvania	29.5	7.9	9.7	23.9	8.7	4.9	11
Philadelphia, Pennsylvania	28	8.4	11.2	25	9.3	5.8	12.2
Key West, Florida	31.6	9.4	11.8	28.4	10.6	6.9	14.3
Decatur, Alabama	31.8	8	11.3	27.2	9.7	6.4	13.1
Shovel Mountain, Texas	34	9.4	11.2	27.2	9.7	6.4	13.2
Tucson, Arizona	27.8	8.4	10.8	23.9	8.3	6	13

The considerable size differences are due entirely to individual variation. Depauperate females sometimes closely resemble that sex of *brunnea*, the supra-anal plate is, however, always more deeply emarginate meso-distad and the cerci, though varying greatly in length, are always more slender distad.

Coloration.—Head with occiput chestnut, shading to blackish brown between eyes; face chestnut, shading laterad and on clypeus to ochraceous-tawny, ocelli buffy. Pronotum antimony yellow, with two very large blotches of chestnut, which fuse caudad and extend to margin of pronotum cephalo-laterad; caudal margin of pronotum margined with a slightly darker shade of chestnut, the lateral margins very narrowly outlined in this color; all of these markings shading gradually into the paler ground color. Tegmina and greater portion of anterior field of wings transparent, chestnut brown, except proximad on tegmina, where a deeper tone makes this portion translucent. Dorsal surface of abdomen antimony yellow, heavily washed with sanford's brown. Supra-anal plate of male transparent and colorless. Limbs ochraceous-buff, becoming tawny distad, spines tawny. In specimens of reces-

sive coloration the pronotal blotches are tawny and greatly reduced. In rare specimens of the maximum intensive coloration these spots, fusing, leave only narrow areas of the pale basic coloration showing latero-caudad.

The young of this species are almost uniform pale brown in coloration, the darker markings very weakly indicated.

Ootheca.—A stout quadrato-ovate capsule; 7.8 by 5.2 mm. in one example before us. This shows, on its polished but microscopically roughened surface, weak, vertical indentations between the egg cells, toward the conspicuous sutural ridge. This ridge is very narrow, but bears along its free margin regularly placed, chitinous, transverse, circular disks separated by a distance about the width of an egg cell.

The present domiciliary species thrives both in tropical and mild climates over the entire world. In the United States it is certainly established farther north than any of the other species of the genus, but, as it is being continually transported by commerce beyond its native northern limit, it is a difficult matter to state just how far northward it is permanently established. In the more northern states, however, we feel certain that records of the insect should be considered adventive. It is undoubtedly firmly established as far northward as New York City. South of the United States the species is found generally over the continent and adjacent islands.

Specimens Examined: 52; 30 males, 18 females and 4 immature specimens.

New York, New York, I to XI, (W. T. Davis; in Zoo Reptile House and elsewhere), 1 ♂, 2 ♀, [Davis Cln.]; VI, 1903, (T. D. O'Connor), 3 ♂, [Hebard Cln.].

Philadelphia, Pennsylvania, I, 14 to X, 12, 1908 to 1916, 6 ♂, 3 ♀, [A. N. S. P. and Hebard Cln.].

Raleigh, North Carolina, III, 5, 1909, 1 ♂, [N. C. Dept. Agr. Cln.].

Washington, N. C., VI, 15, 1905, (G. M. Bentley), 1 ♀, [N. C. Dept. Agr. Cln.].

Asheville, N. C., V, 1 ♀, [Cornell Univ. Cln.].

Thomasville, Georgia, VI, 17, 1903, (for Hebard), 2 ♂, [Hebard Cln.].

Lakeland, Florida, XI, 7, 1911, (W. T. Davis; in hotel), 1 ♂, [Davis Cln.].

Big Pine Key, Fla., VI, 1904, (H. W. Fowler), 1 ♂, [A. N. S. P.]; VII, 6, 1912, (Rehn and Hebard; abundant in quarter-boat at Pine Channel), 1 ♂, [Hebard Cln.].

Key West, Fla., VII, 4, 1912, (Rehn and Hebard; numerous in refuse under fruit stands), 1 ♂, [Hebard Cln.].

Decatur, Alabama, (B. Shimek), 1 ♂, 2 ♀, [Hebard Cln.].

Ship Island, Mississippi, (Lewis), 1 ♀, [A. N. S. P.].
New Orleans, Louisiana, VI, 29, 1916, (Lutz and Rehn) 1 ♂, [A. M. N. H.].
Decatur, Texas, IX, 19, 1914, 2 ♂, [Davis Cln.].
Shovel Mountain, Burnet County, Tex., X, 16, 1901, (F. G. Schaupp), 1 ♂, 2 ♀, [A. N. S. P.].
Cuero, Tex., X, 30, 1910, 2 ♂, 3 ♀, 1 juv. ♂, 1 juv. ♀, 2 small juv., [Cornell Univ. Cln.].
Tucson, Arizona, VII, 23, 1907, (Rehn and Hebard; at light), 1 ♀, [Hebard Cln.].
Phoenix, Ariz., IV, 22, 1902, (E. J. Oslar), 1 ♂, [A. N. S. P.].
Florence, Ariz., VIII, 10 to IX, 18, 1903, (C. R. Biederman), 3 ♂, [A. N. S. P.].
Yuma, Ariz., VII, 27, 1907 and X, 1, 1910, (Rehn and Hebard; at light), 2 ♂, [A. N. S. P. and Hebard Cln.].
Imperial, California, VIII, 10, 1914, (J. C. Bradley), 1 ♀, [Cornell Univ. Cln.].
Los Angeles, Cal., VII, 1886, 1 ♀, [Hebard Cln.].

Periplaneta brunnea Burmeister (Plate VII, figures 12 to 16.)

1838. *P[eriplaneta] brunnea* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 503. [♂, ♀: Chile; Demerara [= British Guiana].]
1892. *P[eriplaneta] truncata* Krauss, Zool. Anzeig., xv, p. 165. [♂, ♀: Teneriffe; Brazil; New Britain.]

Krauss, evidently relying upon a manuscript name of Brunner's, without further reference to the literature, erected the evident synonym, *truncata*. This synonymy was indicated by Kirby in 1904.[291]

The species has been generally correctly recorded in the literature; unfortunately, however, North American material of *P. fuliginosa* has been regularly assigned to the present species by Caudell, Rehn and Hebard, two records by the latter authors, however, being correct.

The species is easily determined from the male genital features; agreeing much more closely, however, with *fuliginosa* and *P. australasiae* than with the distinctive *P. americana*. With the latter species, however, females might easily be confused, the features separating these species in that sex being much less marked, as discussed under *americana*, and the coloration being of the same general character and occasionally very similar.

The insect in size averages smaller than *americana*, with tegmina and wings not as elongate, particularly in the male sex; the paired

[291] Syn. Cat. Orth., i, p. 142.

pronotal blotches are usually less conspicuous, due in part to the normally more deeply colored suffusion at the caudal margin of the pronotum, and the more extensive dark coloration of its lateral margins. Great individual variability in the extent and intensity of these markings, however, sometimes occurs in both species, this wholly ascribable to intensification and recession of the color pattern.

Characters of Male.—(Jewfish, Florida.) Size large, but not as large as *americana;* form stout. Head short and broad; interocular space broad, about one and one-half millimeters in width; ocellar areas forming obtuse angles with interocellar area, ocelli pale and distinct. Pronotum very weakly convex mesad, the sides weakly but distinctly deflexed laterad from the discal area and showing a very weak concavity, oblique sulci of disk subobsolete; form as in *americana*, but not as deep, with caudal angles not as broadly rounded. Tegmina and wings elongate, but not as much so as in *americana*, fully developed. Dorsal surface of abdomen with median segment showing a broad and shallow concave sulcus meso-cephalad, in which is situated a heavy tuft of silky hairs, the more cephalic form a fringe directed caudad, the much larger remainder spring from the medio-longitudinal line and form heavy fringes directed latero-caudad. Four proximal dorsal abdominal segments with latero-caudal angles very sharply rounded;[292] fifth and sixth with these angles weakly acute-angulate produced in increasing ratio caudad, the latter with caudal margin showing a broad convexity meso-laterad on each side and a broad and shallow angulate emargination mesad; seventh and eighth concealed. Supra-anal plate entirely chitinous, surface shallowly concave; roughly trapezoidal in form, with disto-lateral angles broadly rounded and distal margin showing a weak convexity. Cerci moderately elongate, not as attenuate distad as in *americana*, but with apex acute. Sinistrad within the anal chamber, an elongate, slender, chitinous arm extends caudad, curving dorsad toward the apex, which itself is flattened and terminated in a thorn, curved dextrad; near the base of this not extensive distal, flattened portion, on its dorsal margin, is situated a smaller thorn, feebly curved sinistrad. Above this is situated a very elongate chitinous process, directed dextrad, with elongate, straight, aciculate apex; this process bears proximo-dorsad a small, elongate lobe, also directed dextrad. Three other short, stout, curved, chitinous, thorn-like processes occur, one dorso-mesad, the other two dextrad, springing from convolute, chitinous structures. Subgenital plate similar to that of *americana*, except that the broad transverse mesal portion of the free margin shows a weak mesal emargination and the styles are about as long as the plate. Limbs elongate and slender.

Characters of Female.—(Billy's Island, Georgia.) Much like this sex of *americana*, differing from the male in the same features. When compared with females of

[292] Sometimes a slight production of these angles is present, while in some specimens they are more nearly acute than in others.

americana, the head is seen to be decidedly shorter,[293] the pronotum in proportion not as long,[294] the supra-anal plate smaller, with meso-distal emargination less decided and cerci less elongate and less attenuate distad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Thomasville, Georgia	28.5	7.9	10.8	29.9	9.9	4.9	11.9
Everglade, Florida	26.5	6.7	9	24.3	8.5	4.9	9.7
Everglade, Florida	27	7.2	9.7	27.3	8.9	5	11
Jewfish, Florida	25.1	7.1	10.3	27	9.2	4.7	10.2
Katherine, Texas	25.2	7	9.6	26.8	9.1	4.3	9.4
♀							
Billy's Island, Georgia	28.5	7.9	10.8	23.8	9.3	5.1	10.9
Fort Myers, Florida	33	8.9	11.7	26.5	10	5.8	12.3
Everglade, Florida	29.7	8.3	10.6	24.9	9.5	5.4	11.2

Large exotic series before us show that individual size differences of moderate degree are frequent. In series of females from the same locality, decided differences are also found in pronotal amplitude. The differences in average tegminal length between the sexes is much less in *brunnea* than in *americana*.

Coloration.—In general coloration this insect agrees very nearly with *americana*, differing chiefly in the following features. Head with entire occiput dark chestnut brown, this extending to ventral margin of interocellar area. Pronotum with dark blotches usually not as decided, but with caudal margin more heavily suffused with blackish brown, this continued as a narrow peripheral margin about the pronotum. Outlines of these darker markings as vague as in *americana*. Intensification and recession of this color pattern is quite as decided as in *americana* and, in consequence, the normal color differences between the two species are sometimes obliterated.

This domiciliary insect is apparently more nearly peculiar to the tropics and adjacent regions than *americana*. It is circumtropical in distribution and from the exotic material at hand would appear to be the most abundant species of the genus, at least in tropical America. The records given below define the known distribution of the species in the United States. An additional record

[293] The length of the head, however, though normally much greater in *americana*, is found to vary to a surprising degree in that species.

[294] Enough individual variation, however, occurs in the pronotal size and form to make this character true only for the majority, not all, of the specimens compared.

from Asheville, North Carolina, we have placed in the adventive list, as we do not believe the species can become established in as cold a climate.

Specimens Examined: 40; 22 males, 12 females and 6 immature individuals.

Billy's Island, Okeefenokee Swamp, Georgia, VI, 1912, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Thomasville, Ga., IV, 1, 1903, (Hebard), 1 ♂, [Hebard Cln.].

Hastings, Florida, III, 1 to XI, 4, 1901, (A. J. Brown), 3 ♂, 4 ♀, [Morse Cln.].

Lakeland, Fla., (G. G. Ainslie), 1 ♂, [Hebard Cln.].

La Belle, Fla., IV, 27, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Fort Myers, Fla., IV, 1, 1912, (W. T. Davis; at light), 1 ♀, [Hebard Cln.].

Punta Gorda, Fla., XI, 15, 1911, (W. T. Davis), 1 juv. ♀, [Davis Cln.].

Everglade, Fla., IV and V, 1912, (W. T. Davis), 5 ♂, 1 ♀, [Davis Cln.].

Miami, Fla., III, 10, 1917, (Hebard; in warehouse), 4 ♂, 3 ♀, 5 juv.; III, 18, 1917, (for Hebard; in warehouse), 5 ♂, 2 ♀, [Hebard Cln. and A. N. S. P.].

Jewfish, Fla., VII, 11, 1912, (Rehn and Hebard), 1 ♂, [Hebard Cln.].

Katherine, Willacy County, Texas, VIII, 8, 1912, (Rehn and Hebard; in station), 1 ♂, [Hebard Cln.].

Periplaneta australasiae (Fabricius) (Plate VII, figures 17 to 19.)

1775. [*Blatta*] *australasiae* Fabricius, Syst. Ent., p. 271. ["In nave e mare Pacifico et regionibus incognitis revertente."]

In the present distinctive species the pronotal color pattern is the same as in *P. americana* and *P. brunnea*; unlike those species, however, the outline of the darker markings is very sharply defined. In coloration the species further differs from any other of the genus found in America, in having the tegmina strikingly paler in their marginal fields than elsewhere.

The established synonyms of the present species are *Blatta domingensis* Beauvois, *Periplaneta zonata* Haan and *Periplaneta repanda*, *subcincta*, *inclusa*, *emittens* and *subornata*, all of Walker.

In considering the position of this species, the coloration and unspecialized median section of the male supra-anal plate would suggest decidedly closer relationship to *P. brunnea* than to *P. fuliginosa*; the form of the greatly specialized male genital hook, however, is much nearer the type found in the latter species.

Characters of Male.—(Homestead, Florida.) Size large, form stout; but more graceful than in *brunnea*. Head much as in *brunnea*, but not as full; with interocular space slightly less than one and one-half millimeters in width. Pronotum much as in *brunnea*, but proportionately less ample and deeper, without traces of discoidal sulci and with weakly deflexed sides rounding more gradually into the

weakly convex mesal area. Tegmina and wings elongate and fully developed, not as broad proportionately as in *brunnea*. Dorsal surface of abdomen with median segment specialized as in *brunnea*, but with sulcus somewhat deeper and silky hairs of mesal tuft shorter. Other dorsal abdominal segments much as in *brunnea*, caudal margin of sixth showing weaker lateral convexity and very shallow, mesal, angulate emargination. Supra-anal plate entirely chitinous,[295] surface weakly depressed in a weakly arcuate line between cercal bases; lateral margins concave and convergent to the broad, transverse distal margin, latero-caudal angles thus formed subrectangulate and almost acute; production of plate slightly greater than in *brunnea*. Cerci much as in that species, slightly more elongate and a very little more slender. Sinistrad within the anal chamber, an elongate, slender, flattened-cylindrical, chitinous arm extends caudad, showing arcuation ventrad, but distad curving dorso-sinistrad and narrower in this portion preceding the apical portion, to which it is subequal in length; apical portion straight, as wide as shaft before its dorsad curvature, three and one-half times as long as broad, flattened spatulate and scarcely narrowing to the broadly rounded apex, dorsad at the base of this apical portion is situated a sharp, recurved thorn.[296] Above this, a heavy chitinous arm is directed sinistrad, distad it is flattened and the dorsal and ventral margins, which are subchitinous and microscopically serrate, are straight, convergent to the acute apex. Mesad a very slender, almost straight, aciculate, chitinous process is directed dextrad, while sinistrad a large chitinous lobe is found, with caudal face deplanate and distal margin arcuato-angulate. Subgenital plate similar to that of *americana*, except that the emarginations at the style sockets are more decided, the broad transverse mesal portion of the free margin showing a marked mesal emargination and the styles are about as long as the length of the plate, thus a further specialization of the type found in *brunnea* is shown.

Characters of Female.—(Big Pine Key, Florida.) The distinctive coloration of pronotum and tegmina, alike in both sexes of the present species, serves best to distinguish the female of this insect. Compared with the male, this sex is found to be larger and more robust, with pronotum proportionately even deeper and more evenly convex in contour and outline. Tegmina and wings proportionately less elongate, showing a moderate contrast between the sexes. Supra-anal plate with mesal emargination similar to that of *brunnea*. Subgenital plate as typical for the Blattinae.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Orlando, Florida	25	6.9	8.7	26.2	8.4	5.2	10
Everglade, Florida	23.6	6.2	8.3	24.8	7.9	4.6	9.4
Homestead, Florida	25.5	7.2	9.3	26.3	8.4	5.1	10.2

[295] Frequently the texture of the plate is found to be more delicate toward the distal margin, this sometimes extending in a medio-longitudinal line suggesting sulcation.

[296] The distal portion of this process is consequently shaped much like a boat-hook, with blunt point. In this feature *australasiae* shows marked affinity to the otherwise very different *P. fuliginosa*.

♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Tampa, Florida	24.3	8.1	10.1	22.9	8.7	5.9	10.3
Miami, Florida	29	8.7	11.4	25.7	9.7	—	—
Big Pine Key, Florida	27.5	8.8	11.4	25.3	9.3	5.9	11.7
Key West, Florida	26	7.8	10	23.7	8.8	5.8	10.2

Similar differences to those discussed under *brunnea*, due to individual variation, are also found in this species.

Coloration.—The present insect, though showing a type of pronotal color pattern analogous to that found in *americana* and *brunnea*, is much more striking and beautiful, due to the greater intensity of the dark markings and their sharply defined margins. Head with entire occiput shining blackish brown, extending to ventral margin of interocellar area, but with a medio-vertical line in that space of ochraceous-buff, tinged with orange.[297] Pronotum ochraceous-buff with an orange tinge, caudal portion broadly margined with black, other margins very narrowly outlined in black, two large, meso-cephalic, black blotches occur which fuse meso-cephalad,[298] the margins of these markings all sharply defined. Tegmina deep bay, translucent distad, with marginal field ochraceous-buff, except for a narrow border of bay at the costal margin. Abdomen buffy, suffused with dark brown; in some females the dark brown is decided distad, with conspicuous lateral ochraceous-buff blotches on each segment. Coxae buffy, remaining portion of limbs bay.

Of the North American species of the genus, small immature examples of *australasiae* are distinctive in being generally less unicolorous, and in having a decided pale marking latero-caudad on the pronotum. In the later instars, immatures show the transition to the color pattern of the adult.

Ootheca.—A stout, rectangulato-ovate capsule; 10.2 by 5 mm. in one example before us. The surface is microscopically shagreenous, with feeble indentations between the egg cells as in *americana*. Sutural ridge distinct, but much lower than in *americana*, with

[297] This is sometimes subobsolete; rarely it expands into a triangular marking, with apex ventrad, occupying nearly the entire interocellar area.

[298] Sometimes these blotches are more widely fused and send slender rays of this color toward the caudal margin; rarely the blotches are very extensive, leaving only a narrow band of the pale coloration cephalad and a wider suffusion meso-caudad.

serrations only showing traces of the discoidal development which is so striking in that species.

The present insect, though domiciliary, is frequently found under signs on trees near the borders of towns in peninsular Florida. This is the only region in the United States where the species is known to be firmly established, though elsewhere along the southern border, in the warmer portions, it may be brought in by commerce and become a permanent resident. The northernmost records are Fernandina, Green Cove Springs and Cedar Keys, Florida.[299] The species is circumtropical in distribution.

Specimens Examined: 25; 9 males, 7 females, 9 immature specimens.

Cedar Keys, Florida, VIII, 15, 1905, (Rehn and Hebard; under dead petiole bases of cabbage palmetto), 1 small juv., [A. N. S. P.].

Orlando, Fla., (G. G. Ainslie), 1 ♂, [Hebard Cln.].

Tampa, Fla., I, 17, 1904, (Hebard; under sign on tree), 1 ♂, 1 ♀, 1 juv. ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

Punta Gorda, Fla., XI, 14 and 15, 1911, (W. T. Davis; in abandoned house), 2 ♂, [Hebard Cln. and A. N. S. P.].

Everglade, Fla., IV, 5, 1912, (W. T. Davis), 1 ♂, [Hebard Cln.].

Ojus, Fla., II, 29, 1916, (Hebard; under sign on *Pinus caraibea*), 1 ♀, 1 small juv., [Hebard Cln.].

Miami, Fla., VII, 11 to VIII, 23, 1903, (for Hebard), 2 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.]; III, 16, 1915, (Hebard), 1 small juv., [Hebard Cln.].

Musa Isle, Miami, Fla., III, 4, 1916, (Hebard), 1 juv. ♀, [Hebard Cln.].

Homestead, Fla., VII, 10 to 12, 1912, (Rehn and Hebard), 1 ♂, 1 ♀, [A. N. S. P. and Hebard Cln.].

Big Pine Key, Fla., VII, 6, 1912, (Rehn and Hebard; on quarter-boat in Pine Channel), 1 ♀, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1912, (Rehn and Hebard; very common everywhere in town), 1 ♂, 2 ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

Periplaneta fuliginosa (Serville) (Plate VII, figures 20 to 24.)

1839. *Kakerlac fuliginosa* Serville, Hist. Nat. Ins., Orth., p. 70. [♂, North America.]

All other North American records of the present species have been incorrectly referred to *P. brunnea*.[300] The present insect is

[299] The records of this insect's appearance at more northern localities are given and discussed in the adventive list, p. 268.

[300] Either as *brunnea* or *truncata* (=*brunnea*), frequently as "variety a," of Saussure and Zehntner. Those authors in the Biologia have evidently confused material of one of the unicolorous species of the genus under *truncata*, designating such material as variety a. Without examination of the material, it is impossible to determine whether or not this material represents *P. fuliginosa*. Biol. Cent.-Amer., Orth., i, p. 74, (1893).

the only uniformly dark colored species of the genus found in North America, and it is widely distributed in the southern States from central coastal Texas eastward. It is the only species of the genus found in these regions which is not known from other portions of the world.

Close relationship is found to the Japanese *P. picea* Shiraki,[301] the two species agreeing in color, size[302] and even in numerous features of the genitalia. In *fuliginosa* the shape of the male supra-anal plate is different, the projection of its meso-ventral specialization is divided, not rectangulate, while the apical portion of the sinistral concealed genital process is shorter.

Characters of Male.—(Jacksonville, Florida.) Size large, form stout, about intermediate between that of *P. brunnea* and *P. australasiae*. Head much as in *brunnea* but proportionately not as large, with interocular space about one and one-quarter millimeters in width. Pronotum much as in *australasiae*. Tegmina and wings elongate and fully developed, about as broad as in *brunnea*. Dorsal surface of abdomen with median segment specialized as in *brunnea*, but with sulcus distinctly deeper and silky hairs of mesal tuft shorter, though not as short as in *australasiae*. Supra-anal plate entirely chitinous, much as in *australasiae*, but with distal margin weakly emarginate, and mesad at the apex of this emargination project from beneath minute, twin, rounded projections, their surfaces composed of microscopic denticulations; these projections are seen from below to extend latero-cephalad on the ventral surface of the plate as much larger callosities, with surfaces similarly microscopically denticulate (pl. VII, fig. 22). Cerci as in *australasiae*. Sinistral specialized process within anal chamber of the same general type as found in *australasiae*, but with apical portion much more slender, no wider than the preceding curved portion, over five times as long as broad, with apex sharply rounded. Adjacent to this, dextrad, is a small, elongate, subconical, subchitinous process, covered distad with scattered, minute, subchitinous, cylindrical projections. Above, from a convolute, chitinous plate, spring two elongate, slender, adjacent, chitinous claws, directed sinistrad at the bases, but curving evenly dorsad, then dextrad. Ventro-mesad is another corneous production, bearing dorso-sinistrad a short process, shaped like a half-section of tubing, from within the base of which projects a

[301] We are able to determine this from a large series of Japanese specimens of *P. picea* before us.

[302] Serville's *P. pallipalpis* described in 1839, from Java, is apparently a smaller insect than either *fuliginosa* or *picea*. Karny's wretchedly described *P. japonica* and *emarginata*, from Japan, appearing in a superficial key in 1908, are, as far as can be determined from such incomplete work, absolute synonyms of *picea*. Shiraki's description of *picea* was received by Karny before publication, as a footnote indicates, but no effort was made to correct the key. The probability of the above synonymy is further emphasized by the fact that, in the considerable series of Japanese roaches before us, but one dark species of *Periplaneta*, *picea*, occurs.

er, slightly curved, chitinous spine. Sinistrad a large, chitinous plate, l face deeply concave meso-proximad and distal margin broadly rounded, ıe remaining area of the anal chamber. Subgenital plate of same type *mericana*, but with lateral margins continued convergent and produced yond the niches formed by the style sockets, distal margin distinctly ate, as much as in *australasiae*, but in the present species the distal margin r, the margins of the emargination weakly convex and latero-caudal angles ith lateral margins sharply rounded.

racters of Female.—(Jacksonville, Florida.) The uniform coloration of pronotum and tegmina, alike in both sexes of the species, serves best to distinguish the female of this insect from the other North American forms of the genus. Compared with the male, the female is found to be slightly larger and distinctly more robust, with pronotum more ample. The tegmina and wings show hardly any contrast between the sexes. The supra-anal plate has the mesal emargination brief, as in *brunnea* and *australasiae*. Subgenital plate normal for the genus.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Thomasville, Georgia.....	24.5	6.9	8.8	25.6	8.2	5	10.9
Jacksonville, Florida.....	26	7.3	9.2	26.6	8.7	5.9	11.5
Jacksonville, Florida.....	29	7.8	10	27.9	9.4	6.2	11.8
DeFuniak Springs, Florida.	27	7.3	9.2	28.6	8.8	6.1	11.8
Crowley, Louisiana.....	25.7	7	9.2	26	8.2	5.3	11.2
♀							
Thomasville, Georgia.....	26.9	7.2	9.7	22.7	8.6	5.4	10.6
Jacksonville, Florida.....	27.3	8	10.7	26.2	9.4	6	11.7
Jacksonville, Florida.....	25.5	8.3	11.2	26.4	9.7	6.2	11.6
Evergreen, Alabama.....	26.3	7.8	10.2	24.2	9	5.9	10.8
Evergreen, Alabama.....	29.7	8.4	11.1	25.6	9.4	6.3	12.1
Orange, Texas.....	26.3	7.7	10	24.7	8.8	5.8	10.4
Orange, Texas.....	32.5	8.5	10.9	26.4	9.3	6.1	11.6

The extremes of the series before us are all measured. Such variation as is shown by the above tables, may be wholly attributed to individual variation.

Coloration.—Shining brownish black; tegmina, mouthparts and limbs with a bay tinge. Mesonotum and metanotum ochraceous-buff, dorsal surface of abdomen gradually deepening from this color to deep bay distad. In the occasional recessive extremes the coloration is solid; bay, with a chestnut tinge on head, pronotum and limbs.

The young of this insect are immaculate bay, tinged with chestnut.

Ootheca.—Similar to that of *australasiae*, carried with suture directed dorsad.

This species is usually encountered out of doors, in or near towns. Over its range it is frequently found under signs on trees. At Jacksonville, Florida, it was found extremely abundant on the wharves at night. In addition to the records given below, the insect has been recorded from Bainbridge, Georgia, and Fernandina, Florida.[303] It is apparently absent from peninsular Florida and the Florida Keys.

Specimens Examined: 63; 19 males, 39 females and 5 immature specimens.

Brunswick, Ga., VIII, 31, 1911, (Hebard; on hotel veranda), 2 ♀,[305] [A. N. S. P. and Hebard Cln.].

Thomasville, Georgia, I, 3, 1908, (Hebard; under sign on tree), 2 ♀, 1 with ootheca, 2 immature ♀ [304]; I, 9, 1904, (Hebard; dead on sidewalk), 1 ♂; X, 1903, (for Hebard), 1 ♀, [Hebard Cln. and A. N. S. P.].

Jacksonville, Florida, (T. J. Priddey), 1 ♀;[306] VIII, 20, 1905, (Rehn and Hebard; on wharves at night), 7 ♂, 10 ♀, 2 juv. ♂,[307] [Hebard Cln. and A. N. S. P.].

Tallahassee, Fla., IX, 1, 1915, (Hebard; hotel porch at night), 1 ♂, [Hebard Cln.].

DeFuniak Springs, Fla., VIII, 30, 1915, (Rehn and Hebard), 1 ♂, [Hebard Cln.].

Evergreen, Alabama, VIII, 4, 1915, (Hebard; common about hotel, after dark), 1 ♂, 4 ♀, 1 with ootheca, 1 juv. ♂, [Hebard Cln.].

Pass Christian, Mississippi, III, 1 ♀, [Davis Cln.].

New Orleans, Louisiana, VI, 29, 1916, (Lutz and Rehn), 3 ♀, [A. M. N. H. and A. N. S. P.]: VI, 18, 1882, (Shufeldt), 2 ♀; XI, 14, 1882, 2 ♀, [all U. S. N. M.].

Baton Rouge, La., VI, 28, 1908, (A. H. Rosenfeld), 1 ♂, [U. S. N. M.].

Crowley, La., VII, 20 to VIII, 5, 1911, (E. S. Tucker; in house), 3 ♂, [U. S. N. M.].

Jennings, La., fall of 1906, (A. G. Hammar), 1 ♂, [Cornell Univ. Cln.].

Cameron, La., VI, 10, 1905, 1 ♀, [U. S. N. M.].

Orange, Texas, VIII, 19 to IX, 2, 1914, 2 ♂, 8 ♀, 1 with ootheca, [Davis Cln.].

Victoria, Tex., VI, (Caudell), 1 ♀; VII, 27, (A. W. Morrill), 1 ♀; VIII, 10, 1900, (J. D. Mitchell), 1 ♂, [all U. S. N. M.].[308]

[303] Recorded by Rehn and Hebard incorrectly as *P. brunnea*.

[304] Series recorded by Rehn and Hebard as *P. truncata* "var." a, and later as *P. brunnea* "var." a.

[305] Recorded by Rehn and Hebard as *P. brunnea* "var." a.

[306] Recorded by Rehn and Hebard as *P. brunnea* "var." a.

[307] Incorrectly recorded by Rehn and Hebard as *P. truncata*.

[308] Incorrectly recorded by Caudell as *P. truncata* (=*brunnea*).

Subfamily PANCHLORINAE

The species of the Panchlorinae are all almost or entirely confined to tropical regions, two being found within the limits of the United States.

The following features are considered diagnostic. Pronotum usually produced caudad or with distinctive contour, rarely of the Blattid type. Tegmina and wings fully developed in the majority of the species. Wings with numerous incomplete rami of the ulnar vein, intercalated triangle subobsolete or absent. Femora with ventral margins unarmed, except sometimes with a distal spine; ventro-cephalic margins of cephalic femora smooth to heavily fringed with hairs. Tarsal joints very slender and elongate, supplied with moderate to very large pulvilli. Distinct arolia present.

PYCNOSCELUS Scudder

Blatta, *Panchlora* and *Leucophaea*[309] of authors.

1862. *Pycnoscelus* Scudder, Bost. Jour. Nat. Hist., vii, p. 421.

In addition to the widely spread genotype, several Asiatic species of the genus are known.

GENOTYPE, by monotypy: *Pycnoscelus obscurus* Scudder= *Pycnoscelus surinamensis* ([*Blatta*] *surinamensis*) (Linnaeus).

Generic Characters.—Pronotum rather strongly convex, laterad declivent; caudal margin strongly and broadly angulate produced, with apex bluntly rounded and sides feebly concave. Tegmina and wings fully developed in both sexes; reaching, to extending considerably beyond, the apex of the abdomen. Tegmina broad, broadest mesad; discoidal sectors (formed by the numerous branches of the humeral, anal and ulnar veins) weakly oblique, with minute, inconspicuous, transverse veinlets. Wings broad; area of irregular costal veins narrow, bounded by mediastine vein to near apex of wing; ulnar vein with numerous, rather strongly oblique, incom-

[309] Kirby in 1904 (Syn. Cat. Orth., i, p. 151), has attempted to sink *Pycnoscelus* in the synonymy under *Leucophaea*, and select as type of that genus, *Blatta surinamensis* Linnaeus. This action was due to the fact that he objected to genera and species based upon immature material. His action is doubly invalid, as the genotype of *Leucophaea* had already been properly selected as *Blatta maderae* Fabricius, by Rehn in 1903 (Trans. Am. Ent. Soc., xxix, p. 282), and the valid genus *Pycnoscelus* antedates the valid genus *Leucophaea* by three years. It may be further noted that *Rhyparobia*, described in 1892, falls as an absolute synonym of *Leucophaea*, described in 1865.

plete, short, proximal rami and few, short, complete distal rami; intercalated area very narrow and feebly indicated. Subgenital plate of male without styles. Femora with ventral margins all[310] supplied with a single, stout distal spine, all of these spines short, with lateral margins minutely and microscopically serrate; ventrocephalic margins of cephalic femora fringed with hairs which are regularly placed, the more proximal the longest, the shorter distal hairs spiniform.[311] Tarsi elongate and slender; ventral surface of elongate metatarsus fully occupied by an elongate, attenuate pulvillus, ventral surfaces of three succeeding tarsal joints each fully occupied by a large pulvillus. Arolia small.

Pycnoscelus surinamensis (Linnaeus) (Plate VIII, figure 1.)

1767. [*Blatta*] *surinamensis* Linnaeus, Syst. Nat., Ed. XII, p. 687. [Surinam.]

1862. *Pycnoscelus obscurus* Scudder, Proc. Bost. Soc. Nat. Hist., vii, p. 422. [juv. ♀ (*nec.* ♂); Greenfield, Massachusetts.] (Unquestionably adventive.)

The additional established synonyms of the present species are *Blatta indica* Fabricius, *Blatta melanocephala* Stoll, *Blatta punctata* Eschscholtz, *Blatta corticum* Serville and *Panchlora celebesa*, *submarginata* and *occipitalis* Walker.

The present species is circumtropical in distribution, extending its range frequently into subtropical regions. It is distinctive in appearance, the only confusion which could occur with other species found in the United States would be with *Leurolestes pallidus*[312] (*Nauphoeta laevigata* of authors), which species is only superficially somewhat similar in general appearance.

Characters of Female.[313]—(Miami, Florida.) Form robust, structure rather heavy. Head flattened; eyes well developed; interocular space equal to that between the pronounced ocellar spots; ocellar areas with surface feebly concave; from occiput to clypeus, minute pits are scattered over the otherwise smooth surface. Maxillary palpi short and stout; third joint flattened cylindrical, nearly as long as fifth; fourth joint slightly shorter than third, with apex truncate and feebly oblique, proximal portion very slender and slightly deflexed; fifth (distal) joint enlarged and elongate, distal margin oblique and feebly convex from apex to near base of joint. Pronotum

[310] In this feature, the present genus appears to be separable from all others of the Panchlorinae.

[311] These hairs are moderately stout and regular in position; if they were slightly heavier we would use, instead, the term chaetiform spines.

[312] See page 161.

[313] We do not give the male characters in the usual position, as that sex is unknown for the regions here under consideration, where the species may prove to be parthenogenetic.

with glabrous surface showing minute, rather widely scattered pits; lateral portions fully as chitinous as disk, moderately declivent, with margins very broadly cingulate, though but little raised. Length of tegmina and wings somewhat variable, these falling slightly short of, to extending well beyond, the abdominal apex. Tegmina, proximad, thickly supplied with minute pits, these are in series laterad of each vein. Wings transparent, except in narrow area of the irregular costal veins and distal portion of anterior field, where they are translucent. Dorsal surface of abdomen unspecialized. Supra-anal plate feebly and briefly convex above bases of cerci, with free margin there feebly concave; large mesal portion transverse, subtruncate, weakly concave except for a weak medio-longitudinal carinula, distal margin broadly convex, showing a trace of mesal emargination.[314] Styles very short, joints much fused, acuminate tip flattened, dorsal surface weakly convex, ventral surface more strongly convex proximad. Subgenital plate very large, surface convex; distal margin convex, except meso-laterad at base of styles, where it is broadly and shallowly concave, mesad the convexity is weak. Armament of limbs, pulvilli and arolia, as given in generic description. The median and caudal femora have the genicular spine more elongate than the single distal spine of each ventral margin.

Characters of Male.—(Pringabaja, Lombok, Lesser Sunda Islands.[315]) Agrees with the female except in the following characters. Form slightly less robust, structure not as heavy. Interocular space narrower, about three-fifths as wide as that between the similar ocellar spots. Tegmina and wings decidedly more elongate, extending distinctly further beyond the abdominal apex than in any female before us. Supra-anal plate decidedly more delicate in structure, subchitinous, more produced, without medio-longitudinal carinula and with distal margin more evenly convex mesad, not broadly flattened. Cerci short, stout proximad, dorsal surface weakly convex, ventral surface more strongly convex proximad; first eight joints brief, with lateral margins narrowly compressed, tapering rather sharply to slender ninth and tenth joints, the ninth twice as long, the tenth three times as long, as one of the more proximal joints. Meso-dextrad, from below, an elongate oval, delicate, subchitinous plate is directed dorsad in the anal chamber, tapering evenly distad to the acute apex.[316] Subgenital plate springing from bases of cerci, small but broad and little produced, distal margin subsinuato-convex. Styles absent.

Measurements (in millimeters)

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂						
Pringabaja, Lombok		16.8	4.8	5	18.9	6
♀						
Miami, Florida	(53)	16.3–23	4.8–5.8	5.9–7.6	13.6–19	5.6–7

The extremes of size in the entire series before us, are shown by the females measured above.

[314] In some specimens, the median carinula and this trace of emargination are obsolete.

[315] This specimen, from the Fruhstorfer material, was taken in April, 1896, and is now in the collection of the Academy of Natural Sciences.

[316] This is only a portion of the complex concealed genitalia, which here can not be further discussed without damaging the specimen.

Coloration.—(Intensive.) Shining blackish brown. Head, from vertex to clypeus, this color; ocellar spots, genae and clypeus, buffy. Limbs, proximad, suffused ochraceous-buff; tibiae and tarsi russet, the latter paler. Tegmina translucent, blackish chestnut brown; marginal field ochraceous-buff, wholly, or in part, heavily suffused with blackish chestnut brown, cingulate costal margin blackish chestnut brown. Abdomen with dorsal surface dark brown, deepening caudad; ventral surface polished, broadly margined with blackish brown, shading rapidly into brilliant, suffused cinnamon rufous in large mesal portion. Pronotum shining blackish brown, with marginal traces of buffy latero-cephalad. In specimens of the maximum recessive coloration this pale area forms a marginal band, moderately broad cephalad and continued along the lateral margins of the pronotum to near the latero-caudal angles, while the tegmina are transparent, light ochraceous-buff, with numerous microscopic dots of brown[217] and humeral trunk blackish brown proximad. In such specimens the dark portion of the head sometimes shows a slightly paler transverse marking, between the points of juncture of the eyes and ocellar areas. Every degree of variation, from the maximum intensive to the maximum recessive type of coloration, occurs.[218]

General coloration of immature examples, deep chestnut brown to blackish chestnut brown.[219] Head, pronotum, mesonotum, metanotum, median segment, first two dorsal abdominal segments and ventral surface polished, with very minute, scattered, microscopic punctae on head and dorsal polished portions. Remaining dorsal portion of abdomen microscopically finely shagreenous, showing raised and polished points on third segment and fewer raised points on the remaining segments. Head of general coloration, shading to slightly paler on the occiput, cingulate margins

[217] Under the microscope these dots are seen to be arranged in lines between the tegminal veins, each dot representing pigmentation of a minute pit. These lines of dots become more and more broken distad and disappear before the distal portion of the tegmen is reached. To the naked eye, the effect is of a moderate proximal suffusion of the transparent tegmina.

[218] The single Malaysian male before us is of the maximum recessive type of coloration.

[219] Occasional specimens are found of paler general coloration. These represent individuals which, when killed, had but recently reached maturity and had not yet attained their full coloration.

of pronotum also frequently slightly paler. The ocellar spots are not as large as in the adult condition, but still prominent, only disappearing in the early instars. Ventral surface shading to buckthorn brown with a tawny tinge.

The eggs of this species are inclosed in a transparent membrane, which is found within the abdomen. The mass has the general appearance of a partially formed ootheca.

In addition to the large series from the United States, we have examined nearly two hundred specimens of this species, chiefly from the West Indies and Mexico, without finding a single male, adult or immature, from the American continent.[320] The Malaysian male before us has proportionately decidedly longer organs of flight than any female at hand, and the sex may have very different habits from the females, which, with the young, we have often found burrowing on the surface of the ground, in dust or sand under rocks, boards or other debris. The absence of even immature males, among the very large American series of immature specimens before us, may possibly indicate parthenogenesis; prolonged study of living material must be undertaken before this problem can be solved.

The species is abundant in peninsular Florida and the Brownsville region of Texas. It has been found established as far north as Jacksonville, Gainesville and Cedar Keys, Florida; New Orleans, Louisiana, and San Antonio, Texas. Elsewhere in the United States the species has occasionally become temporarily established in green-houses and places similarly artificially heated during cold weather.[321]

Specimens Examined: 126; 55 females and 71 immature females.
Jacksonville, Florida, (T. J. Priddey), 1 ♀, [Hebard Cln.].
St. Augustine, Fla., VIII, 19, 1905, (Rehn and Hebard), 1 ♀, [Hebard Cln.].
Palatka, Fla., VIII, 19, 1915, (Rehn and Hebard), 1 ♀, [Hebard Cln.].
Gainesville, Fla., VIII, 17, 1905, (Rehn and Hebard; in house), 1 ♀, [Hebard Cln.].
Cedar Keys, Fla., VIII, 15, 1905, (Rehn and Hebard), 3 ♀, [Hebard Cln.].
Tampa, Fla., I, 17, 1904, (Hebard), 1 juv. ♀, [Hebard Cln.].
Punta Gorda, Fla., XI, 13, 1911, (W. T. Davis; under board), 1 ♀, [Hebard Cln.].

[320] Brunner states that not a single male was present in his series of over forty specimens from tropical America, and that he had representatives of that sex, only among those which belonged to the small condition found in the East Indies. Nouv. Syst. Blatt., p. 280, (1865).

[321] See page 269.

New Smyrna, Fla., III, 1905, (A. N. Caudell; bred adult XI, 1905), 1 ♀, [U. S. N. M.].

Miami, Fla., I, 28 to XI, 16, 1903 to 1916, (Hebard; for Hebard; Englehardt), 21 ♀, 41 juv. ♀, [Hebard Cln. and A. N. S. P.].

Homestead, Fla., VII, 10 to 12, 1912, (Rehn and Hebard; under debris), 1 ♀, [Hebard Cln.].

Jew Fish, Fla., VII, 11, 1912, (Hebard; in cracks of sun-baked mud), 1 ♀, [Hebard Cln.].

Long Key, Fla., III, 13 and 17, 1910, (Hebard; two under dry fibers at base of petioles of cocoanut palm, others under debris), 5 juv. ♀, [Hebard Cln. and A. N. S. P.].

Key West, Fla., I, 19 to VII, 7, 1904 to 1912, (Hebard; Rehn and Hebard), 8 ♀, 17 juv. ♀, [Hebard Cln. and A. N. S. P.].

Nairn, Plaquemines Parish, Louisiana, XI, 1892, (H. E. Weed), 3 ♀, [Hebard Cln.].

San Antonio, Texas, IX, 18 to 27, (E. Palmer), 5 ♀, 4 juv. ♀, [M. C. Z.].

Victoria, Tex., VI, 1, 1904, 1 ♀; VII, 10, 1907, (J. D. Mitchell), 1 juv. ♀, [both U. S. N. M.].

Sinton, Tex., II, 7, 1911, (C. T. Atkinson), 1 juv. ♀, [U. S. N. M.].

Brownsville, Tex., III, 19, 1908, (Jones and Pratt), 1 ♀, [U. S. N. M.]; VII, (H. Wickham), 1 ♀, [Hebard Cln.]; VIII, 5, 1912, (Hebard; on solid ground in litter under rats' nests, *Neotoma* sp.), 5 ♀, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

PANCHLORA Burmeister

Blatta of early authors.

1838. *Panchlora* Burmeister, Handb. Ent., ii, abth. ii, pt. i, 506.

The genus includes a large number of tropical American forms which separate into several groups.

Seven species were included with the original description, of which three are now separated from this genus.

GENOTYPE: *P[anchlora] pulchella* Burmeister = *Panchlora quadripunctata* (*[Blatta] quadripuncta*) (Stoll), selected by Rehn, in 1903.[322]

Generic Characters.—Pronotum convex, laterad declivent; caudal margin strongly and broadly angulate produced, with apex blunt and sides feebly concave: much as in *Pycnoscelus*, but with mesal portion less convex. Tegmina and wings fully developed in both sexes, extending considerably beyond the apex of the abdomen. Tegmina moderately to very broad; discoidal sectors weakly oblique. Wings broad; area of irregular costal veins narrow, bounded by mediastine vein to near apex of wing; ulnar vein with

[322] Trans. Am. Ent. Soc., xxix, p. 284.

s (usually 9 to 13) short, strongly oblique, proximal in-
rami and few (usually 3 to 4) short, distal complete
ercalated area very narrow and feebly indicated. Supra-
an e of female delicate in structure, sub-bilobate. Femora
v tral margins unarmed, except frequently with a much
ed, single, distal spine on all, or some, of these margins, ex-
cepting the ventro-caudal margin of the caudal femora; ventro-
ce margins of cephalic femora fringed with delicate hairs,
the st proximad. Tarsal joints relatively small; metatarsus
cept ventro-distad, where a rather large, round pulvillus
; three succeeding joints hairy, with brief ventral surfaces
lmost completely filled by a rather large, round pulvillus.
noderately large, truncate distad.

Panchlora cubensis Saussure (Plate VIII, figures 2 to 5.)

1862. *P[anchlora] cubensis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 230. [♀, Cuba.]

Though many names now standing in the literature represent almost certainly synonyms of this species, examination of the types, of at least several of these, must be made before the nomenclature of the plain green species of the genus can be put on a secure basis.[323]

The present species is widely distributed throughout the greater Antilles, Mexico and Central America, its distribution extending within the limits of the United States only in the vicinity of Brownsville, Texas. The insect is frequently shipped alive into the United States, particularly in bananas, but it is an essentially out of doors tropical form and can never become established north of the tropical areas of this country.

Characters of Male.—(Brownsville, Texas.) Eyes rather broad in front, separated by a brief space which in width is usually about one-eighth the greatest diameter of the eye; ocellar areas weakly concave, ocellar spots faintly suggested. Clear margins of pronotum and tegmina weakly tessellate with greenish and in consequence slightly opaque. Tegmina and wings fully developed, normal for the genus. Supra-anal plate very short, very strongly transverse, distal margin broadly concave,

[323] See Hebard, Ent. News, xxvii, p. 217, (1916). The present species is seen to be a member of the first group of the plain species, and should be placed first in the linear arrangement of the species of the genus.

with an obtuse-angulation weakly indicated mesad, disto-lateral angles rectangulate and rather sharply rounded. Cerci short and broad, extending far beyond distal margin of supra-anal plate, lateral margins subparallel to the rather broadly rounded apex. Subgenital plate transverse, distal margin transverse between the cerci. Small cylindrical styles situated on this margin at the inner margin of the base of the cerci, each equal to about one-third the cercal length. Cephalic femora with ventro-cephalic margins supplied proximad with a few hairs, succeeded distad by a more closely-set row of shorter hairs (with a single, distal, atrophied spine, individually present or absent). Other femora unarmed (or with a single, distal, atrophied spine, individually present or absent on the ventral margins), except dorso-distad where a small delicate genicular spine is situated slightly cephalad of the median line.

Characters of Female.—(Brownsville, Texas.) This sex agrees with the male except in the following features. Size larger. Interspace between the eyes from one-half to two-thirds the greatest diameter of the eye.[234] Supra-anal plate strongly produced, bilobate distad, this due to a deep medio-longitudinal cleft. Cerci with lateral margins weakly converging to a more narrowly rounded apex than in male. Subgenital plate with distal margin broadly convex in general outline, but almost straight at base of cerci and with a brief, moderately deep, concave, mesal emargination.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Brownsville, Texas	(4)	12.2–14	3.8–4.3	5–5.3	15.4–16	4.8–5
♀						
Brownsville, Texas	(5)	15.7–18	4.9–5.6	5.9–6.7	18.3–20.4	5.7–6.2

In the very large exotic series before us, the size variation is very much greater.

The species enjoys apparently much the widest distribution of any of the genus and exhibits much the greatest amount of variation.

The general color is light paris green, the antennae ochraceous-tawny, the lateral bands of pronotum and tegmina yellowish white. The tegmina often have a minute, inconspicuous, dark brown dot mesad in their distal half.

Specimens Examined. In addition to nearly 100 exotic specimens: 9; 4 males and 5 females.

Brownsville, Texas, V, 8, 1904, (H. S. Barber), 1 ♀, [U. S. N. M.].

Esperanza Ranch, near Brownsville, Texas, V, 29 to VII, 25, 1904, (C. Schaeffer), 4 ♂, 4 ♀, [Bklyn. Inst., Davis and Hebard Clns.].

[234] This feature is shown, by the large exotic series of *cubensis* before us, to exhibit decided variability in this species.

Subfamily BLABERINAE

The species of this subfamily are almost entirely confined to the American tropics, extending their distribution into the temperate regions of South America.

The following features are considered diagnostic. Tegmina and wings, when fully developed, broad. Tegmina with numerous oblique discoidal sectors. Wings with numerous incomplete proximal, and complete distal, rami of the ulnar vein; no intercalated triangle or apical field is found. Femora unarmed, or supplied with few spines; when proximal spines are present on the ventro-cephalic margins of the cephalic femora, these are always followed by a fringe of hairs; ventro-caudal margins of caudal femora never supplied with a distal spine, often fringed with hairs. Tarsal joints stout, with very large pulvilli. Arolia absent.

BLABERUS Serville

1831. *Blaberus* Serville, Ann. Sci. Nat., xxii, p. 37.
1839. *Blabera* Serville, Hist. Nat. Ins., Orth., p. 74. (Emendation.)
1868. *Libisoca* Walker, Cat. Blatt. Br. Mus., p. 12.
1868. *Sisapona* Walker, ibid., p. 16.
1868. *Tarraga* Walker, ibid., p. 16.

The numerous species of this genus are peculiar to tropical America. A large number of these are probably to some degree domiciliary.

GENOTYPE: *Blaberus giganteus* (*B*[*latta*] *gigantea*) (Linnaeus), selected by Rehn in 1903.[325]

Generic Characters.—Head with vertex hidden by pronotum. Size large to very large, even for this subfamily which contains no small species. Pronotum large, elliptical to roundly hexagonal; surface convex, this more decided above the head, with a symmetrical design impressed weakly on the disk. Tegmina and wings broad, extending well beyond the apex of the abdomen, except in females of some species in which they are slightly shorter. Tegmina with numerous discoidal sectors, which are moderately oblique. Supra-anal plate rectangulate-bilobate in both sexes. Cephalic femora with ventro-cephalic margins armed with a few

[325] Trans. Am. Ent. Soc., xxix, p. 288.

stout, rather short, proximal spines, succeeded by a closely-set row of stout hairs, terminated by a single stout, rather short, distal spine; other ventral femoral margins without spines except distad. Meta-tarsi with ventral surface occupied by an elongate, linear pulvillus, which is enlarged and rounded distad; succeeding three tarsal joints with ventral surfaces occupied by large, rounded pulvilli. Arolia absent.

Specimens representing allied genera show individual variation in presence or absence of proximal spines on the ventro-cephalic margins of the cephalic femora, and of the occasional supplementary distal spine of the ventro-caudal margins of the cephalic and median femora and ventro-cephalic margins of the caudal femora. Careful study of large series will be required, before it can be stated whether the genus *Blaberus*, as at present understood, contains two distinct generic units, or simply divides into two well-marked sections, as indicated by Saussure and Zehntner.

Blaberus craniifer Burmeister (Plate VIII, figures 6 and 7.)

1838. *Bl[abera] craniifera* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 516. [Cuba.]

1839. *Blabera varians* Serville, Hist. Nat. Ins., Orth., p. 78. (In part; ♀.) [♀, Cuba.]

1857. *Blatta* (*Blabera*) *atropos* Guérin (not *Blatta atropos* of Stoll, 1813), in Sagra, Hist. Cuba., Anim. Artic., p. 333. [Havana, Cuba.]

1864. *Blabera atropos* Saussure (not *Blatta atropos* of Stoll, 1813), Mém. Hist. Nat. Mex., iv, p. 233. [♂, ♀: Cuba; Hot coast of Mexico.]

1888. *B*(*labera*) *atropos* Bolivar (not *Blatta atropos* of Stoll, 1813), Mém. Soc. Zool. France, i, p. 133. ["Should be the most abundant species in Cuba."]

The present species shows near relationship to *B. atropos* (Stoll),[326] agreeing in the exceptionally dark general coloration of

[326] **Blaberus atropos** (Stoll)

1813. [*Blatta*] *atropos* Stoll, Natuur. Afbeeld. Beschryv., Kakkerlakken, p. 4, Register p. 14, pl. IId. fig. 8. (No locality given.)

1865. *Bl[abera] fusca* Brunner, Nouv. Syst. Blatt., p. 376. [♀, Chile.]

1868. *Blabera laticollis* Walker, Cat. Blatt. Bs. Mus., p. 5. [♂, British Guiana.]

Brunner, in 1865, applied the name *atropos* to *B. discoidalis* or an extremely closely related species, and redescribed the present insect as *fusca*. Walker's *laticollis* is an evident synonym, which name was placed under *atropos* (there, however, including *craniifer*) by Kirby in 1904.

The most striking features of the species are given above. The concealed male genitalia are similar to those found in *craniifer*, but the surrounding soft median mantle has the free margin fringed dextrad with heavier chitinous teeth, showing distinct uncination,

the tegmina and wings, in the moderately large size (for the genus) and rather broad form. The confusion in the literature is in large part due to the fanciful death's-head marking, figured and described for *atropos*, and in that species situated on the mesonotum and metanotum. In the present species the dark pronotal spot bears pale markings, which afford an even more striking fanciful resemblance to the human eyes, nose and mouth, and failure to recognize the proper position of this marking in the two species has resulted in constant confusion.

The most striking features of difference between the species are as follows. In *craniifer* the male averages distinctly smaller than the female; with pronotum decidedly smaller, the length being contained in the width nearly 1.4 times in the male and 1.49 times in the female. The interocular space in the male is slightly less than, to slightly more than, half the interocellar width; in the female slightly more than half, to slightly less than, the full interocellar width. The dark pronotal spot contains four pale markings suggesting the human eyes, nose and mouth, these very rarely in part obliterated. The tegmina are dark blackish brown with a prout's brown tinge, and have the proximal portions of the marginal and anal fields strikingly buffy, the extent of these markings variable and their distal margins extremely irregular but sharply defined; frequently, and particularly in the males, a large transverse suffusion of buffy is, to varying degrees, weakly indicated mesad on the tegmina.

while sinistrad these are further developed into relatively much larger chitinous processes, rounded distad, with surfaces shagreenous, the largest being situated proximad, which projection is apically irregularly bilobate.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Caparo, Trinidad.	(8)	42.7–49.1	13.3–15.3	19.3–21.6	50.8–56.4	19.2–20
♀						
Caparo, Trinidad.	(14)	57–58.8	14.6–15.9	20.8–22.9	55–57.8	22–23

Specimens Examined: 27; 10 males and 17 females.

Diego Martin, Trinidad, VI, 20, 1915, (R. A. Wood; river estate), 1 ♀, [Hebard Cln.].

Caparo, Trinidad, VI, 1913, (S. M. Klages), 2 ♂, 3 ♀, [A. N. S. P.]; VIII, 1913, (S. M. Klages), 8 ♂, 13 ♀, [Hebard Cln.].

In *atropos* the difference in size of the sexes is much less apparent; the pronotum averages only slightly smaller in the male, the length being contained in the width about 1.43 times in both sexes. The interocular space in the male is slightly more than half, to fully, the interocellar width; in the female slightly less than, to fully, the interocellar width. The dark pronotal spot is normally solid; faint traces of a portion of the same type of marking as found so conspicuous in *craniifer* are apparent in rare examples. The tegmina are dark blackish brown with an argus brown tinge, the marginal fields are brownish buffy, often suffused with darker distad; the tegmina appear otherwise almost solid in coloration until spread, when the humeral trunk is found to be very dark, the anal field rather pale and the mesal portion of the tegmina rather darker than the other distal portions.

The female of *B. varians* of Serville is clearly this species; the male the same as his *B. discoidalis*.

In addition to the diagnostic features described above, the following features are found in the present species.

(Key West, Florida.) Head blackish brown in general coloration, eyes often paler, ocelli and soft portions of clypeus conspicuously buffy. Ocelli distinct; flattened surfaces of ocellar areas slanting mesad, so that the inner margins are raised slightly above the flattened intervening portion of the face. Pronotum subelliptical, the cephalic and caudal margins almost equally convex, this slightly more pronounced mesad on both margins, the latero-caudal angles faintly indicated by a slightly greater convexity there of the caudal margin. Tegmina broad, broadly rounded distad, with apex mesal in position. Wings with anterior field decidedly suffused with brown, posterior field less suffused, all veins dark brown. Dorsal surface of abdomen in both sexes with seventh segment acute-angulate produced latero-caudad, with apices of productions blunt; eighth much narrower across abdomen and but slightly projecting beyond caudal margin of seventh, with small, rounded, latero-caudal projections; ninth still narrower across abdomen, with caudal margin straight. Supra-anal plate projecting and subquadrate, moderately bilobate. Cerci moderately slender, slightly incurved, tapering distad to acute apex, with about seventeen short joints; polished and slightly convex above, strongly convex and very hairy below, with narrow, deep, lateral channels on external and distal portion of internal margins. Mesad in the anal chamber of the male, from above a soft surrounding mantle, a moderately stout, short, tapering, blunt, chitinous projection extends caudad; the surrounding mantle having the free dorsal and distal margins fringed with minute, chitinous teeth. Dextrad of this organ, from a broad chitinous base, a stout subchitinous shaft is directed caudad curving

regularly outward, the convex surface is subchitinous, the inner surface soft, the apex more chitinous, not enlarged, flattened and blunt. Male subgenital plate convex, asymmetrical; distal margin broadly convex from sinistral base to mesal portion of dextral half, there rounding sharply into a deep concave emargination at dextral base, within which the margin is much softer and subchitinous; minute, slender, cylindrical styles are found on this margin at the inner bases of the cerci, the sinistral four times, the dextral six times, as long as broad. Female subgenital plate large and convex, with distal margin regularly convex to mesal portion, which is slightly produced and rounded. Cephalic femora with ventro-cephalic margins supplied proximad with three or four stout, rather short, spines, succeeded by a closely-set row of stout hairs, terminated by a single stout, rather short distal spine; other ventral femoral margins moderately hairy with similar single distal spines.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida (15)	42.2–45.1	12.3–13.6	17.3–18.9	48–51.8	18.8–19.4
♀					
Key West, Florida (28)	48.7–54.8	14.3–14.6	20.9–22.1	48–50.8	19.8–20.6

We have noted in other tropical series of this and other species of the genus that, though large series from one place seldom show very decided differences in size or marking, over the distribution of each species frequent more decided differences are found between different series.

The present species has become firmly established in the United States at Key West, Florida.[327]

Specimens Examined:[328] 54; 16 males, 28 females and 10 immature examples.

[327] It has been recorded from that locality as *atropos* by Rehn, Ent. News xix, p. 441, (1908); as *cubensis* by Rehn and Hebard, Ent. News, xxi, p. 103, (1910), and by those authors as *atropos*, Proc. Acad. Nat. Sci. Phila., 1912, p. 241, (1912), and Proc. Acad. Nat. Sci. Phila., 1914, p. 381, (1914).

[328] In addition the following exotic material is now before us.

Santiago de Cuba, Cuba, II, 24, 1902, (S. H. Hamilton), 3 ♂, 2 ♀, 1 juv., [A. N. S. P.]. (Recorded as *B. atropos* in 1903 by Rehn.)

Santiago de las Vegas, Cuba, IV, 1905, (G. Dimmock), 1 ♂, [U. S. N. M.].

Tekanto, Yucatan, Mexico, 1 ♂, [A. N. S. P.]. (Recorded as *B. trapezoideus* in 1902 by Rehn.)

Tunkas, Yucatan, Mexico, 1 juv., [A. N. S. P.].

Progreso, Yucatan, Mexico, 1 juv., [A. N. S. P.].

Merida, Yucatan, Mexico, (Gaumer), 1 ♂, [Hebard Cln.].

Benque Viejo, British Honduras, III, 1909, (W. H. Sligh), 1 ♂, [U. S. N. M.].

Key West, Florida, VII, 7, 1912, (Rehn and Hebard; under boards in wood shed, many immature examples under nearby boards on ground), 15 ♂, 28 ♀,[329] 10 juv., [Hebard Cln. and A. N. S. P.]; XII, 28, 1909, (Harris), 1 ♂, [U. S. N. M.].

Subfamily CORYDIINAE

The Corydiinae and Polyphaginae share the distinctive character of having the wings, when present, with anal field plane, not folding fan-wise.

The following characters are considered diagnostic for the present subfamily. Head globose; ocellar areas never strongly defined; ocelli absent or very small, then with surfaces convex. Pronotum and tegmina (when present, except in hyaline portions found in some genera) thickly covered with hairs. Tegmina, when present, opaque, transparent, or partially opaque and partially hyaline; when opaque, with venation very weakly defined. Female subgenital plate simple, or valvular, with basal margins of valves forming a deep, acute-angulate emargination.[330] Limbs with ventral margins of cephalic and median femora unarmed, except sometimes distad on ventro-cephalic margins of cephalic femora and both margins of median femora. Tarsi with or without small pulvilli. Arolia present or absent.

HOLOCOMPSA Burmeister

1838. *Holocompsa* Burmeister, Handb. Ent., ii, abth., ii, pt. i, p. 491.

This genus is very widely separated from any other found in the regions here considered. Three species were originally included, of these *cyanea* and *collaris* are synonyms of *nitidula*.

GENOTYPE: *C[orydia (Holocompsa)] collaris* Burmeister = *Holocompsa nitidula* (*B[latta] nitidula*) (Fabricius), selected by Kirby, in 1904.[331]

The two adult Yucatan males differ from any others in the greater extent of the buff tegminal markings. In these specimens the entire anal field is buff, this color breaking through meso-laterad into the broad buff marking bordering the costal margin. These features represent nothing more than color variation, but give the insects a distinctive facies. The British Honduras specimen shows this condition, but the pale areas are less extensive.

[329] A number of lice are present on many of these specimens.

[330] This general type of subgenital plate is found in the Ectobiinae in *Anaplecta* and in the Polyphaginae in *Homoeogamia*. See plate VIII, fig. 11.

[331] Synon. Cat. Orth., i, p. 169.

Description.—Head orbicular; eyes widely separated; [illegible] minute but with surfaces convex; area from between [illegible]lypeal suture smooth, bullate, with a faint, percurrent, [illegible]tral median sulcus. Pronotum heavily supplied with [illegible]vex, narrow lateral portions strongly declivent; cephalic [illegible]l margins truncate, the latter much the broader. Teg- [illegible]a [illegible]led obliquely into two portions, the proximo-lateral por- [illegible]us [illegible]aque and hairy, the remaining portions membranous; [illegible]or [illegible]egmina very weakly defined; distal portion of the anal [illegible]cuous, nearly t[illegible] Wings equal in length to [illegible] greater portion of the venation subobsolete; discoidal vein enlarged in a very elongate costal thickening, median vein delicate, arcuate, terminating in an ovoid thickening, these two thickened areas opaque and adjacent [illegible]he proximal portions of the mediastine, ulnar and anal veins a[illegible] linear and corneous, then suddenly atrophied. Dorsal surface of [illegible]nale abdomen unspecialized; supra-anal plate, in both sexes, convex to sub-bilobate. Subgenital plate of female convex, stro[illegible]y so meso-distad, where a valvular development takes place, v[illegible]sal sutures of valves straight, convergent, from the distal mar[illegible]f the plate to their acute-angulate juncture. Cerci with joints very distinct in both sexes. Limbs short and rather stout. Cephalic femora with ventro-cephalic margins supplied with a row of minute, chaetiform spines, terminated by two heavy, elongate, distal spines, of which the last is much the longer; other ventral femoral margins unarmed. Median and caudal femora each supplied with a very elongate genicular spine. Tarsi relatively small; pulvilli appreciable distad on first and second tarsal joints, completely filling brief ventral surface of succeeding third and fourth joints. Arolia present, moderately well developed.

Holocompsa nitidula (Fabricius) (Plate VIII, figures 8 to 11.)

1781. *B[latta] nitidula* Fabricius, Spec. Ins., i, p. 345. [[♀, from description] Surinam.]

Burmeister's *cyanea* and *collaris* have been shown to represent the male and female respectively of this species,[332] the sexes of which are very dissimilar.

[332] Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 381, (1914).

Characters of Male.—(Key West, Florida.) Size very small, form stout, tegmina and wings projecting well beyond apex of abdomen. Head fully as broad as long; eyes very widely separated, above not extending inward beyond antennal bases; ocelli minute, oval, with surfaces convex; occiput, as far ventrad as ocelli, supplied with numerous minute hairs. Pronotum very hairy, convex, becoming strongly so laterad; cephalic and caudal margins transverse, lateral margins divergent caudad and weakly convex; cephalic angles very broadly rounded and very broadly obtuse-angulate, caudal angles broadly rounded and subrectangulate. Scutellum hairy, proportionately large. Tegmina proximad, opaque and hairy, bounded by a concave line from apex of anal vein to apex of discoidal vein; remaining distal portion delicate, hyaline. Wings delicate, hyaline, with two elongate, opaque stigmata at costal margin, which are contiguous. Cerci with eight strongly defined, rounded joints, none much longer than broad, tapering to acute apex. Supra-anal plate moderately transverse, free lateral margins weakly convex, general form subbilobate. Subgenital plate with surface convex; weakly and roundly produced sinistro-distad, with apex bearing an elongate, minute style; more weakly and more acutely produced dextro-distad, with apex bearing an even smaller, elongate style; between these productions the distal marginal surface of the plate is narrowly flattened, with the margin concave.

Characters of Female.—(Key West, Florida.) Agrees with male except in the following features. Somewhat larger and distinctly broader, with tegmina and wings less projecting beyond the apex of the abdomen. Ocelli elliptical. Supra-anal plate very weakly transverse, free margin evenly convex. Subgenital plate with surface convex, deeply and sharply acute-angulate emarginate in mesal quarter, this occupied by two valves, with surfaces weakly concave, separated by a medio-longitudinal cleft, as in *Compsodes* and suggesting a less specialized type of the condition found in *Homoeogamia* (pl. VIII, fig. 11). Limbs and armament, pulvilli and arolia, as given in generic description.

The coloration of this species affords numerous valuable specific diagnostic characters. The contrast between the sexes, in coloration, is very great.

Measurements (in millimeters)

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen
♂					
Key West, Florida	(16)	4.8–5	1.6–1.8	2.1–2.2	4.4–4.6
♀					
Key West, Florida	(10)	5.3–6.2	1.9–2.2	2.6–2.9	4.4–4.6

Coloration.—♂. Head, underparts and limbs usually blackish. Antennae blackish, with a pale distal annulus, including three or four joints. Pronotum and proximal opaque portions of tegmina, black, with a weak, metallic green-blue sheen. Distal portions of

tegmina clear hyaline, scarcely clouded. Wings hyaline, except black stigmata; margin of posterior field clouded.

♀. Pronotum mars yellow to orange rufous, often weakly suffused with dark brown at caudal margin. Head usually slightly darker; antennae similar, suffused with dark brown proximo-mesad; underparts slightly paler than pronotum. Proximal opaque portions of tegmina black, with a metallic green-blue sheen, stronger than in male; distal portions hyaline, with a faintly yellowish tinge and weakly clouded proximad and distad. Wings hyaline, except black stigmae; margins of anterior and posterior fields clouded, this not as wide as on the posterior field in the male.

The above series of twenty-six specimens, in the Philadelphia collections, represents all the material which has as yet been found established in the United States. At Key West, Florida, the species was found with *Supella supellectilium*, *Blattella germanica*, *Leurolestes pallidus* and *Periplaneta americana* in folds of burlap bags under the counter in a fruit store, and with *Blaberus craniifer* between old boards in a wood shed. The species is apparently domiciliary and widely distributed through the American tropics.

COMPSODES[333] new genus

Related to *Latindia* Stål, differing, in the male sex, in the following features.[334] Head with eyes not very widely separated, the interocular width not decidedly greater than that between the antennal sockets; disk of male pronotum almost perfectly elliptical, not decidedly truncate caudad, with a medio-longitudinal, linear sulcus and broad, but not deep, oblique sulci latero-caudad, lacking a transverse, obtuse-angulate, linear sulcus cephalad; cephalic and caudal femora of male not strikingly enlarged, the caudal femora supplied with a genicular spine as well as the median

[333] From κομψή and -ώδης, neat looking.

[334] These comparisons are made with the original description of *Latindia*, the genotype of which is *maurella* Stål, and specimens of both sexes of the genus before us, representing two species, of which one is North American.

Latindia dohrniana Saussure and Zehntner

1894. *Latindia dohrniana* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 111, pl. V, fig. 7. [♀; Guatemala.] (Tegmina fully developed.)

Motzorongo, Vera Cruz, Mexico, II, 1892, (L. Bruner), 2 ♂, 1 ♀, [Hebard Cln.].

femora. The females of *Latindia* are quite similar to the males, in the present genus that sex is very different and entirely apterous.

GENOTYPE: *Compsodes delicatulus* (*Latindia delicatula*) (Saussure and Zehntner).[335]

The genus includes five species; *argentinus* (Rehn), *delicatulus* (Saussure and Zehntner), *cucullatus* (Saussure and Zehntner), *schwarzi* (Caudell) and *mexicanus* (Saussure),[336] males of all of which are at present before us, the female sex of *delicatulus* alone being represented or known.

Generic Description.—Size very small, form slender. Head of male rounded, hairy between eyes which are very ample, with interspace slightly less, to slightly greater, than that between the antennal sockets, ocelli obsolete. Head of female slightly more flattened, pilose between eyes which are greatly reduced, lateral, with interspace very much greater than that between the antennal sockets, ocelli obsolete. Pronotum of male very weakly convex, transverse elliptical, surface thickly covered with short hairs; disk with a distinct to subobsolete linear medio-longitudinal sulcus and broad, distinct, but not deep, oblique, latero-caudal sulci. Pronotum of female evenly and weakly convex, cephalic margin

[335] We have selected this species as the genotype, as it is the sole representative of the genus in which the female is known.

Compsodes delicatulus (Saussure and Zehntner)

1894. *Latindia delicatula* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 112, pl. V, fig. 7. [♂; Zapote, Guatemala.]

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, III, 24 to IV, 26, 1906, (Barber and Schwarz), 14 ♂, 3 ♀, 3 juv. ♂, 2 juv. ♀, [U. S. N. M. and Hebard Cln.].

The following features are found to be diagnostic for this species.

♂. Interocular space three-fifths that between the antennal sockets. Pronotum almost perfectly elliptical. Tegmina with surface corrugated and heavily supplied with moderately elongate hairs, particularly distad; less ample, less smooth and supplied with much more numerous and longer hairs than in *schwarzi*. Dextral margin of subgenital plate, from style to base of cercus, fringed with moderately elongate hairs; genitalia otherwise similar to *schwarzi*. Arolia microscopic, vestigial, occasionally absent on one or all of the limbs.

In the female the eyes are separated by a distance twice that between the antennal sockets. In this sex arolia are absent.

[336] The remaining species, which have been described as members of *Latindia*, are variously distinctive in important features, which will probably necessitate the erection of one or several additional new genera.

broadly rounding to caudal margin, which is straight, transverse, with latero-caudal angles rather sharply rounded, surface microscopically pilose. Mesonotum and metanotum of female with latero-caudal angles weakly acute-angulate produced, with apices broadly rounded; entire dorsal surface microscopically pilose. Tegmina and wings fully developed in male, absent in female. Tegmina pilose, with marginal and scapular fields very narrow, veins and diagonal channel distinct, discoidal sectors oblique. Cerci of male elongate, with distinct joints, tapering to the apical joint, which is aciculate; of female short, submonolithiform, tapering to the acute apex. Subgenital plate of female valvular, with bases of valves straight, convergent from the distal margin of the plate to their acute-angulate juncture. Limbs very slender in male, somewhat heavier in female. Femora unarmed, except for a delicate genicular spine on median and caudal femora. The caudal margin of the cephalic femora not supplied, in the male, with an exceedingly heavy, mesal, projecting tooth, followed by other smaller teeth, as characteristic for that sex in *Latindia* s. s. Tarsi elongate and slender, without pulvilli. Arolia minute, vestigial or absent.

Compsodes schwarzi (Caudell) (Plate X, figures 1 to 4.)

1903. *Latindia schwarzi* Caudell, Proc. Ent. Soc. Wash., v, p. 165. [♂; Madero Canyon, Santa Rita Mountains, Arizona.]

This species shows close relationship to *C. mexicanus* (Saussure),[337] differing from that insect in the smaller size, proportionately less ample tegmina and wings and the once forked or unbranched median vein of the wings.

Characters of Male.—(Brownsville, Texas.) Size small, intermediate between that of the smaller *C. delicatulus* and the larger *C. mexicanus*. Head with inter-

[337] **Compsodes mexicanus** (Saussure)

1868. *Latindia mexicana* Saussure, Rev. et Mag. de Zool., 2e sèr., xx, p. 100.

1870. *Latindia mexicana* Saussure, Miss. Sci. Mex., Rech. Zool., Orth., p. 110, pl. II, figs. 53 to 55.

1894. *Latindia tolteca* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 113. Jalapa, Vera Cruz, Mexico, IX, (O. W. Barrett), 1♂, [A. N. S. P.].

There is little doubt but that *tolteca* is an absolute synonym of this species, as admitted possible by the original authors. Their hypothesis, as to the sex of the type, clearly amounts to no more than a wild guess.

ocular space very slightly wider than that between the antennal sockets; vertex smooth, but thickly dotted with microscopic pits, these the sockets of microscopic hairs. Pronotum transverse elliptical, with greatest width slightly caudad of mesal point; divided by a feeble, linear, medio-longitudinal sulcus; latero-caudal oblique sulci of disk broad and shallow. Tegmina very delicate; diagonal channel very conspicuous to median vein on both tegmina; discoidal sectors not numerous (6 to 7), oblique, the majority springing from the ulnar vein, which parallels the anal sulcus to its juncture with the diagonal channel. Wings hyaline, strongly iridescent; tinged with buff and pilose in distal area of irregular costal veins; ulnar vein with three arcuate rami, complete to margin of wing. Dorsal abdominal segments unmodified. Supra-anal plate produced, very delicate, with lateral margins converging and rounding broadly into distal margin, which is weakly angulato-emarginate mesad or nearly transverse. Cerci elongate, with seven joints, these elongate and distinctly articulated, three distal joints small and sharply decreasing in size, the distal joint very sharply conical. Genital hook situated sinistrad within anal chamber, very elongate and slender, directed dextrad and curving weakly to near the apex, where the shaft is flattened and somewhat expanded, thence brief and very slender, curving sharply cephalo-dorsad to the acute apex. In addition, two curved, chitinous spikes, springing from the same base, are found sinistrad and a single heavier and blunter spike dextrad. Subgenital plate symmetrical, as broad as long, with small, slender, rather elongate styles, symmetrically placed laterad, between which the distal margin of the plate is moderately convex and broadly truncate. Limbs elongate and slender. Ventro-cephalic margins of cephalic femora fringed with short, microscopic hairs. Tarsal joints extremely elongate and slender, caudal metatarsus nearly half as long as the elongate caudal tibia. Minute, microscopic, vestigial arolia present.

The female of this species is unknown.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Esperanza Ranch, Texas...	(2)	6–6.3	1.8–1.8	2.6–2.7	7.2–7.5	2.7–2.8
Brownsville, Texas.....	(2)	5.3–6.5	1.7–1.7	2.3–2.4	6.2–6.8	2.4–2.4
Sierra El Tosti, Mexico....	(3)	5.4–5.5	1.7–1.8	2.1–2.2	6.4–6.8	2.2–2.5
San José del Cabo, Mexico..	(3)	5.3–5.9	1.6–1.7	2–2.2	6.4–7	2.1–2.6

General coloration buffy, diaphanous. Head cinnamon brown, eyes black. Underparts and limbs ochraceous-buff. Pronotum with disk dilute cinnamon brown, lateral margins transparent, tinged with buckthorn brown, moderately broad caudad, broader laterad. Tegmina transparent, buckthorn brown. Wings hya-

line, with a faint buffy tinge, strongly iridescent; area of costal veins nearly opaque, light ochraceous-buff.

In addition to the type locality, the present species was previously known only from Brownsville, Texas.

Specimens Examined: 19; 19 males.

Beeville, Texas, X, 24 and XI, 1, (E. A. Schwarz), 2 ♂, [U. S. N. M.].

Sabinal, Tex., III, 1910, (F. C. Pratt), 1 ♂, [U. S. N. M.].

Nueces River in Zavalla County, Tex., VII, 1, 1910, (F. C. Pratt), 1 ♂, [U. S. N. M.]

Brownsville, Tex., II, 24, 1909, (F. C. Pratt), 1 ♂, [A. N. S. P.]; IV, 30, 1909, (H. S. Barber), 1 ♂, [Hebard Cln.].

Esperanza Ranch, Brownsville, Tex., VI, 1904, (C. Schaeffer), 2 ♂, [Bklyn. Inst. and Hebard Cln.].

Sabino Basin, Santa Catalina Mountains, Arizona, VIII, 15 to 21, 1916, (Lutz and Rehn), 1 ♂, [A. M. N. H.].

Madero Canyon, Santa Rita Mountains, Ariz., VI, 7 to 14, 1898, (E. A. Schwarz), 3 ♂, *type* and *paratypes*, [U. S. N. M.].

Sierra El Tosti, Lower California, Mexico, X, 1893, (G. Eisen), 4 ♂, [Cal. Acad. Sci. and Hebard Cln.].

San José del Cabo, L. Cal., Mex., 3 ♂, [Hebard Cln. and A. N. S. P.].

ATTAPHILA Wheeler

1900. *Attaphila* Wheeler, Amer. Nat., xxxiv, p. 860.

In addition to the single North American species originally described, four likewise myrmecophilous species of the genus have since been described by Bolivar from South America.[338] The remarkable antennae, with all but the second and third joints decidedly longer than wide, are, in that author's opinion, sufficiently different from those of the other known species of roaches, to warrant the erection of a new subfamily, which he terms the Attaphilinae.[339]

Kirby, in 1904 placed the genus in the Polyphaginae.[340]

[338] Comunic. Mus. Nac. Buenos Aires, i, p. 334, (1901). (*Attaphila bergi.*)
Mitteil. Schweiz. ent. Gesellsch., xi, pp. 137 to 138, (1905). (*Attaphila aptera, sexdentis* and *schuppi.*)

[339] Comunic. Mus. Nac. Buenos Aires, i, 334, (1901).

[340] Syn. Cat. Orth., i, p. 173.

In 1908, Shelford, without comment, placed *Attaphila* last of the genera of the Phyllodromiinae[341] (= Pseudomopinae). Though monographic studies may prove the Attaphilinae a valid subfamily, we feel that the wisest present course is to assign the genus to the Corydiinae, the numerous hairs on the exposed surfaces of the body, evenly convex head, without ocelli, in both sexes, and the ventral femoral margins armed only distad, except the cephalic margins of the caudal femora, leading us to this conclusion. The apparently distinctive antennal characters found, very possibly, may be merely representative of the high specialization of a more common type to exceptional environmental conditions.

GENOTYPE by monotypy: *Attaphila fungicola* Wheeler.

Generic Description.[342]—Size minute, form elliptical. Exposed surface clothed with scattered hairs. Head very broad, ocelli and ocellar areas obsolete. Eyes greatly reduced. Antennae with all but second and third joints decidedly longer than wide. Pronotum evenly convex, with caudal margin transverse. Tegmina: decidedly reduced with venation obsolete, or absent in male; absent in female. Wings: vestigial pads or absent in male; absent in female. Dorsal abdominal segments unmodified in both sexes. Limbs stout, tarsal joints very short, without pulvilli. Cephalic femora with margins unarmed, except for a few distal hairs on the ventro-cephalic margin, terminated by a single, small, delicate spine. Median and caudal femora each with a heavy and very elongate genicular spine. Ventral margins of same supplied with a few hairs, except cephalic margin of caudal femora, which is supplied with several stout spines. Proportionately very large arolia present, completely filling the area between the exceedingly delicate tarsal claws.

[341] Gen. Ins., Fasc. 73, Orth., Blattidae, Phyllodromiinae, p. 23.

[342] The genus and species are described together by Wheeler. We give the following characters found in the type species (excepting those qualifying tegminal and wing development), which appear worthy of generic rank. Without being able to examine Bolivar's species, we can not state whether these are all attributable to *Attaphila* as restricted in the diagnosis given above. Bolivar fails to state definitely the spine formulae of the limbs. In his generic description he gives "Femures con espina apical superiormente . . . ;" certainly in part an incorrect statement, as in none of the roaches we have seen are the cephalic femora furnished with a dorso-distal genicular spine.

Attaphila fungicola Wheeler (Plate X, figures 5 and 6.)

1900. *Attaphila fungicola* Wheeler, Amer. Nat., xxxiv, p. 860, figs. 3 to 6. [4 ♂, 2 ♀, 60 juv.; University of Texas, [Austin], Texas.]

This, the smallest species of the known North American Blattidae, is the only described form of the family found on this continent north of Mexico, in which pure symbiosis with ants occurs. The species is treated fully by Wheeler; not only is a very thorough diagnosis given, but its habits, environment and relationship with the host, *Atta fervens* Say, are also discussed in detail.

Characters of Male.—(Austin, Texas.) Size minute; form stout, elliptical; exposed surface clothed with scattered, rather elongate hairs. Head very broad, occiput extensive and evenly convex, ocelli absent. Eyes vestigial, greatly reduced, lateral, concealed except latero-ventrad by the latero-cephalic angles of the pronotum, and separated by a comparatively considerable distance from the antennal sockets. Antennae moderately stout; first joint about three times as long as its basal width, second not as wide, with length equal to width, third slightly shorter, succeeding joints increasing decidedly in length to eighth, of which the sixth is the heaviest.[343] The joints beyond the first are carried normally at a decided angle to it, laterad. Pronotum ample, evenly convex; cephalic margin straight, transverse, rounding broadly into the divergent, weakly convex lateral margins, latero-caudal angles bluntly rounded subrectangulate, caudal margin transverse, showing a slight convexity. Tegmina rhomboidal, extending laterad slightly beyond base of first dorsal abdominal segment, without trace of veins, at costal margins the more produced, rounding broadly into distal margins which are truncate, weakly oblique to sutural margins, which slightly overlap. Wings vestigial pads, with weak traces of venation. Dorsal abdominal segments unmodified, with lateral margins moderately convex and latero-caudal angles broadly rounded. Supra-anal plate very small, triangular, with apex bluntly rounded. Cerci represented by rounded lobes scarcely longer than wide, dorsal surface deplanate, ventral surface convex. Sinistrad within the anal chamber, a delicate, slender, elongate genital hook is produced caudad,[344] then curving sinistrad to apex which, due to the continued curvature, is directed cephalad, the shaft expanding very slightly distad. Meso-dextrad, adjacent to the genital hook, a sharp, straight, aciculate process is directed caudad.[345]

Characters of Female.—(Austin, Texas.) Agrees with male except in the following features. Form decidedly broader, broadly oval. Tegmina and wings absent. Mesonotum with latero-caudal angles rectangulate and sharply rounded; metano-

[343] As observed by Wheeler, the antennae in this species are always incomplete, having been clipped off by the host, *Atta fervens*. In the series before us the number of remaining joints in the different individuals ranges from 1 to 6 to 8 to 10.

[344] Normally this organ is wholly concealed, probably lying along the inner surface of the subgenital plate.

[345] This latter organ is more often apparent than the genital hook and is described and figured by Wheeler.

tum with these angles rectangulate, but bluntly rounded. "Posterior edges of the lamina supra-analis notched in the middle. Cerci with a very clearly circumscribed linear white spot on the dorsal surface. Subgenital plate large, nearly as long as broad, evenly rounded behind."[346]

Measurements (in millimeters)[347]

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia
Austin, Texas	2.65	.945	1.65	.95	1.35	.59
Austin, Texas	2.7	1.06	1.89	.71	1.53	.59
Austin, Texas	2.7	.95	1.77	.71	1.35	—
♀						
Austin, Texas	2.45[348]	.945	1.9	—	—	.55

The dorsal contour of the insect is strongly convex, the male tegmina rounding laterad, so that the costal margins are below the lateral abdominal suture. In consequence, were the pronotum and tegmina flattened out, an increase would be found for the dimensions given.

Wheeler's figures 3 and 4 are of the dorsal aspect of the insect, thus the cephalic margin of the pronotum and the costal margins of the tegmina are not visible, due to the convexity of the dorsal surface.

Coloration.—Amber yellow, sometimes suffused with sudan brown, the suffusion strongest on the limbs. Eye facets blackish brown.

Immature specimens before us of both sexes, as stated by Wheeler, resemble the female except in the smaller size and the distinctly paler coloration.

The habits of this singular roach and its unmolested presence in large numbers in the fungous gardens of the ant, *Atta fervens* Say, are fully discussed in the paper in which the species is described. The species is known only from the type locality.

Specimens Examined: 12; 6 males, 1 female and 5 immature individuals.

Austin, Texas, II, 19, 1903, (W. M. Wheeler), 6 ♂, 1 ♀, 1 juv. ♂, 2 juv. ♀, 2 small juv., [A. N. S. P., Hebard Cln. and U. S. N. M.].

[346] The distal portion of the abdomen is, in the single female before us, drawn in and somewhat shrivelled. We consequently quote these features from Wheeler's original description.

[347] Taken under the microscope.

[348] Distal portion of abdomen retracted in this specimen.

Subfamily POLYPHAGINAE

ow Kirby in separating this section from the Corydiinae. se two subgenera are distinctive in having the wings, when present, with anal field plane, not folding fan-wise.

The males of the Polyphaginae show the greatest ocellar development and specialization found in the Blattidae, this constituting one of the most satisfactory single characters to separate the Polyphaginae from the Corydiinae.

In the species of the present subfamily, the sexes are exceedingly dissimilar. The females of some species differ from the males in all but a few generic diagnostic characters, such as the number of apical spines on the tibiae.

The following characters are considered diagnostic for the present subfamily. Head of males, with ocellar areas strongly defined and ocelli large, with surfaces convex; females, greatly simplified, without strongly defined ocellar areas and ocelli represented by indistinct spots. Pronotum and tegmina (when present), thickly covered with hairs. Tegmina of males, with venation distinct. Subgenital plate of females, simple or valvular with basal margins of valves forming a deep acute-angulate emargination.[349] Subgenital plate of male with, or without, styles. Limbs with ventral margins of femora unarmed, but very hairy; or with a single distal spine on cephalic margin of cephalic femora, or, in the females of some species, with a few nodiform processes meso-proximad on these margins. Median and caudal femora with, or without, a dorsal genicular spine. Tarsi with, or without, pulvilli and arolia.

We have thought it best to include, in the present study of this subfamily, all of the North American material before us; this representing examples from localities as far south as the state of Guerrero, Mexico. This material is by far the largest representation of the Polyphaginae ever studied, 568 specimens. All of the species found in the United States should be found in Mexico, while the correlation of the purely Mexican species is of great importance in working out the relationship of the forms distributed north of that country.

[349] This type is found in the Ectobiinae in *Anaplecta* and in the Corydiinae in *Holocompsa* and *Compsodes*.

The North American species of the Polyphaginae, owing to Rehn's studies,[350] require but little revisionary treatment at the present time. The much larger series now available, however, offer an opportunity to ascertain further the relative values of the characters which have been used and the degrees of variation found in the different species. Moreover, numerous important male genitalic characters have been found and are here described in detail. It is evident that the genera here considered have a wide distribution in Mexico; the small series available from that country have proven most interesting and valuable, but, until extensive field work has been accomplished in the regions south of the southern border of the United States, no definite knowledge of the different species distribution in that territory can be obtained.

To the history furnished by Rehn in his revision, we may add that the subgenera, described in that paper, have since been properly raised to generic rank,[351] while names, which have been proposed for forms or races of three of the species, are here placed in their proper synonymy. The Old World genus *Polyphaga* undoubtedly includes more than one generic unit, as is shown by material in the exotic collections now before us.

None of the North American species have pulvilli or arolia.

Key to the North American Species of the Polyphaginae (based on males[352]*)*

A. Marginal and scapular fields of tegmina broad. Subgenital plate with styles. (Supra-anal plate produced in a delicate bilobate projection. Cerci jointed, evenly tapering. Cephalic femora with ventro-cephalic margin hairy, these hairs shorter distad, with a single heavy and elongate distal spine. Median and caudal femora alone bearing a single dorso-cephalic genicular spine, this spine stout and elongate. Cephalic tibiae bearing nine spines. Median and

[350] A Revision of the Orthopterous Genus Homoeogamia. Proc. Acad. Nat. Sci. Phila., 1903, pp. 177 to 192, (1903).

[351] Caudell, Proc. U. S. Nat. Mus., xliv, p. 605, (1913).

[352] Within the orifice formed by the supra-anal and subgenital plates, which we here designate as the anal chamber, we find, in males of the present group, dextrad two plate-like structures, here termed the dextro-dorsal and dextro-ventral plates, and sinistro-dorsad a long, slender, chitinous process, here termed the genital hook. These structures show features of very great specific diagnostic value and it is unfortunate that they can seldom be observed without removing the subgenital plate. It is for this reason that we term them concealed genitalia, in apposition to the wholly external or internal genitalic features.

caudal tibiae bearing six apical spines.) (Size large. Dextro-dorsal and dextro-ventral concealed genital plates are two smooth, brief, corneous lobes; concealed genital hook facing inward in form of interrogation point and not enlarged near apex.) ..... **Homoeogamia mexicana** Burmeister [353]

AA. Marginal and scapular fields of elongate tegmina narrow. Subgenital plate without styles.

B. As in first parentheses under A, but with cephalic femora lacking a distal spine on the ventro-cephalic margin. Concealed genital hook curved inward. Subgenital plate not specialized.

C. Concealed genital hook not enlarged near apex. Dextro-dorsal concealed genital plate, a narrow, elongate lobe; dextro-ventral concealed genital plate very large, with surface concave (and margins irregularly rounded).

D. Size large to medium. Dextro-ventral concealed genital plate with margins very broadly and strikingly shagreenous. Interocular space normally about half as wide as interocellar space.
Arenivaga bolliana (Saussure)

DD. Size medium to rather small. Dextro-ventral concealed genital plate with margins very briefly and obscurely roughened or smooth.[354]
Arenivaga rehni new species

CC. Concealed genital hook enlarged near apex, barbed. Dextro-ventral concealed genital plate, a very large, oval lobe, with surface strongly convex (hiding in part the smaller dextro-dorsal concealed genital plate).

D. Size medium to rather small. Dextro-ventral concealed genital plate without projection. Interocular space normally less than interocellar space. Marking of pronotum not pictured. . **Arenivaga erratica** Rehn

DD. Size rather small. Dextro-ventral concealed genital plate with elongate, heavy spike, directed meso-dorsad. Interocular space normally subequal to interocellar space. Marking of pronotum pictured, except in suffused condition. ..... **Arenivaga apacha** (Saussure)

BB. Supra-anal plate not produced, distal margin weakly convex. Cerci not jointed, not evenly tapering. Femora with margins and genicular areas very hairy but unarmed. Cephalic tibiae bearing eight spines. Median and caudal tibiae bearing seven apical spines. Concealed genital hook curved outward. Subgenital plate with specialized organ proximo-sinistrad.

[353] We have omitted reference to *guttipennis* and *aequalis* in the present key, names very probably synonyms of *mexicana*. See discussion under genus *Homoeogamia*, page 221.

[354] Owing to the lack of material over the greater portion of this species' distribution, we are unable to give the normal width of the interocular space. Decided variation occurs, see page 230.

C. Size rather small. Pronotum strongly transverse. Tegmina with weakly oblique discoidal sectors. From base of concealed genital hook, springs another appendage of equal length, with acute, elongate, chitinous apex.

Eremoblatta subdiaphana (Scudder)

CC. Size very small. Pronotum very weakly transverse. Tegmina with longitudinal discoidal sectors. From base of concealed genital hook, springs another appendage, with acute, abbreviate, chitinous apex.

Eremoblatta hirsuta new species

Other features, requiring more detailed discussion and in consequence omitted from the above key, offer further aid in separating some of the more closely related species. The male concealed genitalic features are distinctive in each species, but can only be properly studied when the subgenital plate has been removed.

Key to the North American Species of the Polyphaginae (based on females)

Females are much heavier and broader than the males of the respective species and have the limbs decidedly heavier, with homologous spines relatively heavier and longer. In the females the length of the tarsal joints is decidedly reduced to varying degrees. As this sex is evidently a decidedly less specialized condition, much fewer specific differential characters are to be found,[355] though remarkable generic differences exist.

A. Head somewhat similar to that of male, but larger and broader, with interocular space much greater and ocelli absent. Tegmina present, of length of abdomen, corneous, the surface densely shagreenous; wings represented by brief pads. Subgenital plate valvular, compressed and decidedly produced meso-distad, with a percurrent, linear, medio-longitudinal sulcus, the nearly vertical sides of the valves longer than wide and roughly trigonal, their basal sutures convergent to their acute-angulate juncture proximad. Cephalic femora with ventro-cephalic margin hairy, these hairs more closely set, shorter and stouter distad, suggesting chaetiform spines, terminated distad by a heavy, elongate spine.

Homoeogamia mexicana (Burmeister)

AA. Head remarkably different from that of male. Tegmina and wings absent. Subgenital plate broadly convex in general form, without a sulcus or any decided production meso-distad. Cephalic femora lacking a distal spine.

[355] Indeed, as may be seen in the key, none of the characters which separate females of *Arenivaga rehni*, *erratica* and *apacha* are sufficiently decided to enable one, not familiar with females of the three species, to determine occasional individuals of this sex with certainty.

rse clypeal swelling of face deep. Body covered with minute hairs; rs along the margin, particularly cephalad. Cephalic femora with halic margin hairy proximad, succeeded in distal half by a rather row of short, chaetiform spines.

rge to medium, form suborbicular. (General color blackish; cephalic m of pronotum often rather narrowly buff, the caudal margin of this marking brace-shaped.) ..... **Arenivaga bolliana** (Saussure)

CC. Size medium to rather small, form decidedly more elongate.

D. Form elliptical. General color immaculate reddish brown.
Arenivaga rehni new species

DD. Form broad ovate. General color reddish brown, often narrowly paler mesad along cephalic margin of pronotum.

E. Limbs more elongate and slender. Segments of abdomen normally each bearing laterad a more or less strongly defined darker dot.
Arenivaga erratica Rehn

EE. Limbs shorter and stouter. Segments of abdomen normally immaculate ..... **Arenivaga apacha** (Saussure)

BB. Transverse clypeal swelling of face not as deep. Body thickly covered with minute hairs; very much longer hairs along the margin, particularly latero-caudad. Cephalic femora with ventro-cephalic margin bearing a few stout, very short, rather closely placed, knob-like spines proximad, succeeded in distal two-thirds by a weakly arcuate row of very widely spaced, stout, very short, knob-like spines. (Size medium small to small; form suborbicular. General color immaculate reddish brown, hairs golden.)

C. Pronotum distinctly transverse. Hairy covering heavy.
Eremoblatta subdiaphana (Scudder)

CC. Pronotum very weakly transverse. Hairy covering very heavy.
Eremoblatta hirsuta new species

The immature males approximate much more closely the adult females, than they do adults of their own sex. This is shown by the enlarged and much less specialized head, with eyes much reduced and well-defined ocelli absent (these indicated only by spots), and by the pronotal and abdominal contour.

The species found within the United States are all from the Southwest, where they represent the only forms of the Blattidae inhabiting the desert regions proper. Some species of *Parcoblatta* and *Compsodes schwarzi*, also occur in the Southwest, but are confined in distribution to the desert and semi-desert mountain areas, being rarely found out on the desert floor and then only as migrants from their preferred environment. The exotic species of the Polyphaginae are also, in large part, primarily desert inhabitants.

HOMOEOGAMIA Burmeister

1838. *Homoeogamia* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 490.

GENOTYPE, by monotypy: *Homoeogamia mexicana* Burmeister.

This genus differs from *Arenivaga* and *Eremoblatta* in the armament of the cephalic femora in both sexes; in the male, the marginal field of the tegmina is broader and styles are present on the subgenital plate; in the female, distinctive and somewhat reduced tegmina and atrophied wings are present and the subgenital plate is valvular, the valves remarkably produced and compressed.

In both *Homoeogamia* and *Arenivaga* the male tegmina usually (except in *A. erratica*) show a faint glassy luster, never as pronounced as in *Eremoblatta*.

Homoeogamia mexicana Burmeister (Plate IX, figures 1 and 2.)

1838. *H[omoeogamia] mexicana* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 490. [♂, ♀; Mexico.]

There is every probability that both *guttipennis*[356] and *equalis*[357] of Walker are synonyms of the present species. If this is true, Saussure's *azteca*,[358] now placed as a synonym under *guttipennis*, will also be referred to the present synonymy.

Both sexes of the present species are distinctive in appearance from the species of the other American genera of the Polyphaginae. The numerous characters by which the species is distinguished are given in the preceding keys.

We would note that the styles of the male subgenital plate are situated laterad; they are moderately stout, cylindrical and about five times as long as broad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Jalapa, Vera Cruz, Mexico.....	22.5	7.4	11	29.8	10.8
Jalapa, Vera Cruz, Mexico.....	23	6.7	10.4	29.3	10
Tacubaya, Distrito Federal, Mexico.	22.5	6.7	10.7	29.6	10.8

[356] 1869. *Zetobora guttipennis* Walker, Cat. Dermapt. Saltat. and Blatt. Suppl. Br. Mus., p. 123. [♂, Eastern slope of mountains of southern Mexico.]

[357] 1871. *Polyphaga aequalis* Walker, Cat. Dermapt. Saltat. Br. Mus., v, Suppl. Cat. Blatt., p. 3. [♂, South Mexico.]

[358] 1893. [*Homoeogamia*] *azteca* Saussure, Rev. Suisse Zool., i, p. 296. [♂, ♀; [Omilteme, Guerrero, 8000 feet,] Mexico.]

♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Distrito Federal, Mexico	21.3	7.6	12.4	19.1	9.3
Guadalajara, Jalisco, Mexico	24.3	8.1	13.7	21.1	9.9
Uruapan, Michoacan, Mexico	22.7	8.4	14.3	20.8	9.8

Coloration.— ♂. Pronotum solid mars brown, deepest mesad. Head, to clypeus, blackish chestnut brown; eyes prout's brown; ocelli zinc orange; clypeus, underparts and limbs ochraceous-tawny, paler proximad on abdomen. Tegmina translucent to transparent; marginal field ochraceous-buff, with cingulate margin russet; other portions, proximad mars brown for half the extent of the anal field, thence with small, irregular, transparent, colorless patches, these becoming increasingly numerous and larger distad, as the dark ground color becomes more dilute; portion of dextral tegmen, concealed when at rest, in large part hyaline, the diagonal channel broad and polished in proximal portion. Wings hyaline, with an elongate, narrow, opaque, warm buff area meso-distad on the costal margin, the immediate costal margin beyond this tawny.

♀. Pronotum and head as in male, excepting the much reduced ocelli, which are warm buff. Limbs and ventral surface of abdomen chestnut brown. Tegmina weakly translucent, mars brown, shading distad to dresden brown with irregular, transparent blotches of buckthorn brown, these smaller than the corresponding blotches in the male. Wings hyaline, tinged with ochraceous-tawny.

In addition to a male and two females in the National Museum without data, we have had before us 14 specimens; 10 males and 4 females.

Guanajuato, Guanajuato, Mexico, (A. Duges), 1 ♀, [U. S. N. M.].

Jalapa, Vera Cruz, Mex., VI, 23, 1898, 1 ♂; VIII and IX, (O. W. Barrett), 5 ♂, [A. N. S. P. and Hebard Cln.].

Distrito Federal, Mex., VII and VIII, 1910, 1 ♂, 1 ♀, [U. S. N. M.].

Tacubaya, D. F., Mex., VIII, 1 ♂, [Hebard Cln.].

Uruapan, Michoacan, Mex., 1899, (S. N. Rhoads), 1 ♀,[359] [A. N. S. P.].

Guadalajara, Jalisco, Mex., (D. L. Crawford), 3 ♂, 1 ♀, [A. N. S. P.].

[359] Recorded by Rehn as *H. azteca*.

ARENIVAGA Rehn

1903. *Arenivaga* Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 181.
1913. *Arenivaga* Caudell, Proc. U. S. Nat. Mus., xliv, p. 605.

GENOTYPE, by original selection: *Arenivaga bolliana* [*Homoeogamia bolliana*] (Saussure).

This genus differs from *Homoeogamia* in the absence of a distal spine on the ventro-cephalic margin of the cephalic femora in both sexes; in the male, the marginal and scapular fields of the tegmina are narrower and styles are not present on the subgenital plate; in the female, tegmina and wings are wanting and the subgenital plate is simple. It agrees with *Homoeogamia* in the armament of the median and caudal femora in both sexes, and, in the male, in the character of the supra-anal plate and the incurved concealed genital hook.

In addition to other generic features given in the key, we would state that, in the male, the ocelli are decidedly produced, with face deeply concave; the supra-anal plate is very thin, bilobate, and the subgenital plate is of the same asymmetrical character as in *Homoeogamia mexicana*, but more convex, with dextro-lateral angle much more broadly rounded and distal margin decidedly more concave-emarginate. In the females, the narrow, greatly reduced eyes terminate dorsad above the antennal sockets, while the clypeal swelling terminates dorsad distinctly below a line drawn between the antennal bases (extending often as high as the ventral margins of the antennal sockets).

In the immature stages of the species of this genus, we find that the males have minute, vestigial styles present laterad on the caudal margin of the subgenital plate. In the immature females, similar vestigial styles are present, laterad on the caudal margin of the eighth ventral abdominal segment, which, with the seventh, disappears in the adult condition, the sixth ventral abdominal segment forming the subgenital plate.

Arenivaga bolliana (Saussure) (Plate IX, figures 3 to 5.)

1893. [*Homoeogamia*] *bolliana* Saussure, Rev. Suisse Zool., i, fasc. 2, p. 298. [♂, Texas.]

1904. *Homoeogamia bolliana* variety *nigricans* Caudell, Mus. Brooklyn Inst. A. & S., Sci. Bull., i, p. 107. [♂; Esperanza Ranch, Brownsville, Texas.]

pecies is much the largest of the present genus. It is elated to *A. rehni*, but may be readily separated by its ger size, distinctive male genital characters, and different oration and pronotal marking, when present, in the female. ıales exhibit much color variation; specimens with tegıgs and all but the broad pale cephalic margin of the pronoid blackish, with a perceptible brownish suffusion, are ; from the Rio Grande valley (Brownsville, Eagle Pass). ıve been named *nigricans* by Caudell. The condition is maximum of intensive coloration found in the species, ery gradation to the normal type is found in the series before As we have already frequently observed, in the Orthoptera variations are by no means worthy of varietal significance, we consequently place *nigricans* in the synonymy here.

To the given male characters, we would add the following observations.

(Waco, Texas.) Interocular width slightly less than, to slightly more than, half the interocellar width. Pronotum with angles usually sharply rounded, sometimes quite broadly rounded, as in *A. erratica;* this variation sometimes shown on one side and not on the other. Concealed genital hook proportionately very small when compared with that of *rehni* or *erratica*, shaft curving gently inward to near distal extremity, which is sharply curved inward, not enlarged, with apex sharp, directed proximad. Dextro-dorsal concealed genital plate, a large, flattened, smooth corneous finger, somewhat arcuate; dextro-ventral concealed genital plate, a large, irregular, corneous disk, strongly concave, with dorsal margins very broadly and strikingly shagreenous.

The adult female being hitherto unknown we here describe that sex.

♀; Carrizo Springs, Dimmit County, Texas. (A. Wadgymar.) [Hebard Collection.]

Description of Female. Very unlike male, apterous, size much larger, form suborbicular. Dorsal surface roughened and leathery, covered with very short, but stout, minute hairs, most of which are usually rubbed off, except along the margins of the body. Pronotum broad, cephalic margin evenly arcuate, at an angle of slightly over 90°, caudal margin weakly produced mesad, with sides broadly concave. Supra-anal plate transverse, trapeziform, with distal angles rounded; mesal third of caudal margin truncate, with an indication of mesal emargination. Subgenital plate very large, roundly produced mesad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Dallas, Texas.....(1)	21	6.2	10.2	25	9.9
Shovel Mountain, Texas(10)	18.4–23	5.6–6.2	9–9.8	23.3–24.4	9.2–9.8
Carrizo Springs, Texas.(3)	21.7–23.8	5.8–6.4	9.6–10.5	25.3–26.2	9.8–10.7
Mission, Texas.....(1)	21	6.4	10.2	25.2	10.6
Brownsville, Texas....(10)	15.7–19.6	4.8–5.6	7.7–8.9	19.2–22.3	7.7–8.8

♀				Width of mesonotum	Width of metanotum
San Marcos, Texas....(1)	20.2	7.7	12.2	15.7	16
Carrizo Springs, Texas.(2)	20–23.8	8.3–8.7	13.8–14.8	17.2–17.5	17.4–18.3
Carrizo Springs, Texas, Described specimen.(1)	23.2	8.2	14.6	18	18.2
Mission, Texas.....(1)	23.2	8.2	13.4	16.2	16.8
Brownsville, Texas... (12)	17.2–21.3	6.1–7.4	10.1–11.6	12.1–14.1	12.8–15

The above measurements show that considerable size variation is to be found in the species. The average smaller size of the Brownsville series is almost certainly due to local environmental conditions. This series is from the dense jungle brush of the river plain; the much larger specimens, normal in this respect, from Mission, but sixty miles from Brownsville, were taken on gravelly hillocks, in scattered scrub.

Some variability is shown by the material before us in the contour of various parts; often the margins of the pronotum, supra-anal or subgenital plates show irregularities.

Coloration.— ♂. (Maximum recessive.) Head with eyes and face blackish brown; ocelli yellow ocher; clypeus ochraceous-buff, as are the underparts and limbs. Pronotum light ochraceous-buff, disk heavily suffused with mars brown. Tegmina transparent, light ochraceous-buff, with a few, very widely scattered flecks of prout's brown, immediate costal margin tawny distad. Wings clear transparent, with an elongate, narrow, opaque, warm buff area meso-distad on the costal margin, the margin beyond this tawny. (Maximum intensive.) Head entirely blackish brown, ocelli liver brown. Pronotum solid blackish brown, except for a broad band of ochraceous-buff along the cephalic margin. Tegmina translucent, solid blackish brown, becoming transparent distad. Wings transparent, strongly and evenly suffused with

blackish brown. Every kind of gradation between these extremes is shown by the series before us.

♀. Dorsal surface blackish brown, usually with a bracket-shaped area of ochraceous-tawny mesad on the cephalic margin of the pronotum. Exposed ventral surface of pronotum, mesonotum and metanotum, ochraceous-orange. Limbs and ventral surface of abdomen liver brown, the abdominal segments mesad, excepting the subgenital plate, polished claret brown.

Ootheca.—A single ootheca is before us, measuring 9.4 by 5.5 mm. The moderately convex sides are polished, with numerous, very delicate, longitudinal ridges, while toward the suture, weak convexities indicate the six pairs of egg cells contained within. The ventral margin is straight, directed moderately upward at the extremities. The suture is formed by a very delicate, high ridge, with margin straight, microscopically roughened by regular and extremely numerous, minute ridges, which run obliquely to the base of the suture on its sides; at one extremity this suture is abruptly terminated, forming a right-angle and in this portion extending to the mesal portion of the extremity of the ootheca, at the other extremity it curves strongly ventrad.

At Brownsville we found the species locally numerous under debris and leaf mould under mesquite trees, and in rats' nests, *Neotoma* sp., in the jungle brush of the river plain.

The easternmost records for the species are Dallas, Waco, Victoria, Corpus Christi and Brownsville, Texas, while the westernmost records are Bosque County, Kerrville and Pecos High Bridge, Texas.[260]

Specimens Examined: 107; 56 males, 25 females and 26 immature individuals.
Dallas, Texas, (J. Boll), 1 ♂, probably taken with type, [U. S. N. M.].
Waco, Tex., VII to X, (Belfrage; common at light), 9 ♂, [M. C. Z.].
Bosque County, Tex., IX, 14 to X, 15, (Belfrage), 9 ♂, [M. C. Z. and Hebard Cln.].

[260] Scudder and Cockerell's record of this species from Las Cruces, New Mexico, applies properly to a specimen of *A. erratica* which is now before us. Saussure's record from "New Mexico" is very probably attributable to the same species, for recent very considerable field work, in Texas west of the Pecos and in southeastern New Mexico, has not produced a single specimen of the present species. Rehn has recorded males from Round Mountain, Texas, several times, and females from Austin, Texas, as this insect; the specimens upon which these records were based are before us and likewise represent large examples of *A. erratica*.

Shovel Mountain, Burnet County, Tex., IX, 1 to X, 20, 1901, (F. G. Schaupp), 11 ♂, [A. N. S. P. and Hebard Cln.].

San Marcos, Tex., 1 ♀, [A. N. S. P.].

Victoria, Tex., III, 3, 1909, (J. D. Mitchell), 1 ♀; (J. D. Mitchell), 1 ♂, 1 juv. ♀, [U. S. N. M.].

Corpus Christi, Tex., (Mrs. S. M. Hughes), 1 ♀, [Hebard Cln.].

Brownsville, Tex., VI, 3 to 6, 1904, (H. S. Barber), 6 ♂, 1 ♀, 1 juv. ♀; VIII, 4 and 5, 1912, (Hebard and R. A. Vickery), 4 ♂, 11 ♀, 9 juv. ♂, 10 juv. ♀; XI, 20, 1907, (J. D. Mitchell), 1 ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Esperanza Ranch, Brownsville, Tex., VIII, 1, (C. Schaeffer), 1 ♂, [A. N. S. P.].

Mission, Hidalgo County, Tex., VIII, 5 and 6, 1912, (Hebard; ♂ lit on bush illuminated while searching at night for *Insara*, ♀ in rats' nest, *Neotoma* sp.), 1 ♂, 1 ♀, [Hebard Cln.].

Ringgold Barracks, [near Rio Grande], Tex., (Schott), 1 ♂, 1 ♀, [M. C. Z.].

Kerrville, Tex., IV, 22, 1908, VI, 1, 1901, (F. C. Pratt; at light), 2 ♂, [U. S. N. M.].

Sabinal, Tex., VI, 2, 1910, (Pierce and Pratt), 1 ♀, 1 juv. ♀; X, 18, 1910, (F. C. Pratt; at light), 2 ♂, [U. S. N. M. and Hebard Cln.].

Knippa, Tex., VII, 3, 1910, (F. C. Pratt), 2 juv. ♂, [U. S. N. M. and Hebard Cln.].

Uvalde, Tex., VI, 18 to 20, (H. Wickham), 1 ♂, 1 ♀, [U. S. N. M.].

Nueces River, Zavalla County, Tex., IV, 30 and VI, 29, 1910, (F. C. Pratt), 1 ♂, 1 ♀, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 4 ♂, 3 ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Eagle Pass, Tex., (Horn), 2 ♂, [M. C. Z.].

Devils River, Tex., IV, 1903, (H. A. Pilsbry), 2 juv. ♀, [A. N. S. P.].

High Bridge, Pecos River, Tex., (H. A. Pilsbry), 1 ♀, [A. N. S. P.].

Arenivaga rehni new species (Plate IX, figures 6 to 10.)

Related to *A. bolliana* and *A. erratica*, but differing from both in the distinctive male genitalia and eyes, which in the male sex are normally separated by a very brief interval. From *bolliana*, the species may further be separated by the average decidedly smaller size and more slender form, and from *erratica* in the dark pronotal marking of the males, which, in the present species, appears to be always solid, not broken to varying degrees, as in the entire series of *erratica* before us.

Type.— ♂; San José del Cabo, Lower California. (Gustav Eisen.) [Hebard Collection Type no. 408.]

...n of Type.—Size rather small, form acute elliptical. Head with width bet... ...es very brief, much less than half that between ocelli. Pronotum convexo-trigonal, the basal line being represented by the moderately convex caudal margin; surface covered with minute hairs, cephalic margin more thickly clothed with stouter, longer hairs. Tegmina elongate, subcoriaceous and weakly glossy, apex well rounded; costal margin of tegmina and wings supplied with minute hairs, on the tegmina these become as heavy proximad as on the cephalic margin of the pronotum. Important characters of armament of limbs and genitalic features given in key. Concealed genital hook very slender, elongate, reaching to near apex of production of supra-anal plate, curving gently inward to near distal extremity, which is sharply curved inward, slightly enlarged, with apex sharp, directed proximad. Dextro-dorsal concealed genital plate, a rather large, flattened, smooth, corneous finger, somewhat arcuate; dextral-ventral concealed genital plate, a large, rounded, corneous disk, moderately concave, with dorsal margins narrowly and feebly shagreenous. Subgenital plate bulbous, irregular in outline, shallowly concavo-emarginate distad (as given in generic discussion).

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Very unlike male, apterous, size much larger, form more broadly acute elliptical. Dorsal surface finely roughened, clothed with very short, minute hairs, along the margins these hairs are longer and heavier, particularly in the cephalic half. Pronotum broad, cephalic margin arcuate at an angle of about 90°, caudal margin weakly produced mesad, with sides broadly and weakly concave. Supra-anal plate transverse, weakly trapeziform; caudal margin very broadly convex, with an indication of mesal emargination. Subgenital plate large, roundly produced mesad.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Kits Peak Rincon, Arizona		18	5	7.7	23.6	8.6
San Lorenzo, Coahuila, Mexico	(2)	17.2–18.4	5	6.9–7	19.5–21.6	7.8–8.4
San José del Cabo, Lower California, *type*		13.3	4.2	6.1	15.6	6.2
San José del Cabo, Lower California, *paratypes*	(12)	13–18	3.9–4.7	5.7–6.8	15.3–20.9	6–7.8
Comondu, Lower California	(4)	14.5–15	3.9–4.3	5.8–6.2	18.3–19.5	6.7–6.9
Sierra El Tosti, Lower California	(3)	13.7–14	4–4.2	5.8–6.1	16.3–18.3	5.9–6.1
San Pedro, Lower California	(1)	13	4.2	6.1	15.4	6.2

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Iguala, Guerrero, Mexico	(1)	14.5	4.1	6	17	6.4
Jojutla, Morelos, Mexico	(1)	14	4.1	6.1	16.9	6.4
♀					Width of mesonotum	Width of metanotum
San Lorenzo, Coahuila, Mexico	(8)	16.8–18.8	6.1–6.3	8.6–8.7	10.3–11.6	11.1–11.7
San José del Cabo, Lower California, *allotype*		18.7	6.3	9.6	11.7	12.1
San José del Cabo, Lower California, *paratype*	(5)	17.6–18.4	6.1–6.3	8.2–9.2	10.8–11	11.4–11.6
Sierra El Tosti, Lower California	(5)	15.8–19	5.8–6.7	8.7–10	11–12.1	11.4–12.6

The above measurements show decided size variation in the species, irrespective of geographic distribution. This feature appears to be found in all the species of the subfamily, of which we have sufficient material for such study. In the present series, frequent small males have distinctly more ample tegmina and wings than larger individuals of the same sex.

Coloration.—All of the material before us from Lower California is dried alcoholic, but the colors appear to have been changed little, if at all.

♂. General color light buff. Eyes blackish brown. Interocular space to between the ocelli, dark chestnut brown; other portions of head, underparts and limbs of general coloration. Pronotum of general coloration, with a large, meso-caudal, uniformly colored blotch of ochraceous-buff, to deep chestnut brown. This marking is sometimes broadly shield-shaped and not continued to the caudal margin of the pronotum; frequently it is continued to that margin, while in some specimens the marking expands over the entire pronotum, leaving but a narrow band of the pale general coloration on the cephalic margin, extending to, and including, the caudal angles. Tegmina of general coloration, slightly more glossy than is usual in *erratica*, more or less marked with very fine maculations of a slightly darker shade. The tegmina are frequently darkened at the base of the anal sulcus; in some blackish brown, with base of the humeral vein the same color.

♀. General color of dorsal surface bay, often somewhat paler mesad on the proximal portion of the abdomen. Pronotum with lateral margins often with a very narrow, weakly defined, buffy border. Underparts, excepting abdomen, buffy, the face and limbs washed with orange, the tibiae slightly darker and the caudal tibiae heavily washed with bay. Ventral surface of abdomen glabrous, mahogany red to burnt sienna, the subgenital plate with rough surface approaching bay.

Note below decided color differences in other material.

Variation.—The interocular width in the males shows very marked variation in some specimens before us. In the Lower California series the majority of males are normal in this respect, a few have this interspace slightly wider, while one or two have the margins of the eyes almost touching.

The males from Iguala and Jojutla, both localities in the Rio de las Balsas drainage, agree in being very dark in general coloration; all but the cephalic margin of the pronotum is bone brown, the tegmina of this color, mottled with a slightly paler shade. A similar intensive coloration is found in *A. bolliana* and *A. apacha*. In the Jojutla specimen the interocular space is normal; in the Iguala individual it is unusually broad, nearly two-thirds as wide as the interocellar space, but the example is easily determined by the perfectly normal genitalia.

The males from Kits Peak Rincon, Arizona and those from San Lorenzo, Coahuila, are dark in general coloration, agreeing with the specimens from southern Mexico discussed above, except that the tegmina are not as dark. In the one perfect male from the latter locality, the interocular space is exceptionally broad, over two-thirds as wide as the interocellar space.

The striking differences in interocular width, size and coloration in these few specimens from so widely separated localities, in our opinion, represent only the decided variation occurring within the species. A much wider knowledge of the species and its distribution must exist before such features, known to be decidedly unstable (but not to such extreme degrees) in series from the same locality, can be fully and definitely explained.

Specimens Examined: 68; 27 males, 18 females, 10 immature males and 13 immature females.

Kits Peak Rincon, Baboquivari Mountains, Arizona, about 4050 feet, VIII, 1 to 4, 1916, (Lutz and Rehn), 2 ♂, [A. M. N. H. and A. N. S. P.].

San Lorenzo, Coahuila, Mexico, V, (E. Palmer), 2 ♂, 8 ♀, [M. C. Z., Hebard Cln. and A. N. S. P.].

San Pedro, Lower California, Mex., 1893, 1 ♂, [Hebard Cln.].

Sierra El Tosti, L. Cal., Mex., X, 1893, (G. Eisen), 3 ♂, 5 ♀, 3 juv. ♂, 4 juv. ♀, [Cal. Acad. Sci., Hebard Cln. and A. N. S. P.].

Comondu, L. Cal., Mex., III, 1889, (C. D. Haines), 4 ♂, 1 juv. ♂, 1 juv. ♀, [Cal. Acad. Sci. and Hebard Cln.].

San José del Cabo, L. Cal., Mex., 13 ♂, 6 ♀, *type*, *allotype*, *paratypes*, 6 juv. ♂, 7 juv. ♀, [Hebard Cln., Cal. Acad. Sci. and A. N. S. P.].

Jojutla, Morelos, Mex., VIII, 4, 1903, (W. L. Tower), 1 ♂, [Tower Cln.].

Iguala, Guerrero, Mex., IX, 1888, 1 ♂, [Hebard Cln.].

Arenivaga erratica Rehn (Plate IX, figures 11 to 13.)

1903. *Homoeogamia* (*Arenivaga*) *erratica* Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 187. [♂; Prescott, Arizona.]

The present insect is closely related to *A. apacha;* males may be separated by the distinctive dextro-ventral concealed genital plate in that species, while in *erratica* the interocular width is normally less than, very rarely equal to, that between the ocelli, and the pronotal marking is normally less decided and never pictured. No males of the present species before us have the tegmina much suffused with darker brown, a condition which occurs frequently in *apacha*. Females of the two species are separable by the decidedly heavier and shorter limbs in *apacha*, this most noticeable in the tibiae; in *apacha* the fringe of hairs about the cephalic margin of the body is also appreciably heavier.

This species, with *A. rehni* and *apacha*, averages decidedly smaller than *A. bolliana*, but several males of the present insect from central Texas are larger than the smallest males of *bolliana* before us. As in the other species of the group, this size variation appears to be due rather to peculiar local environmental conditions, than to purely geographic influences.

In addition to the characters given in the key, the following features are of diagnostic value in the male sex.

The interocular width sometimes varies decidedly; normally slightly less than that between the ocelli, we have a few specimens in which these dimensions are subequal, while rarely the interocular width is decidedly less, in one example before us equalling but one-quarter that between the ocelli. Concealed genital hook small and slender, curved gently inward; apex enlarged and blunt, bearing a sharp basal tooth on the inner side directed proximad, thus resembling the barb of a fish hook. Dextro-dorsal concealed genital plate, a large, smooth, ovate, chitinous lobe; dextro-ventral concealed genital plate a flattened, chitinous plate, which shows neither shagreenous surface (as in *bolliana* and *rehni*) nor sharp projection (as in *apacha*).

The adult female not having been previously recognized, we here describe that sex.

♀; Round Mountain, Blanco County, Texas. (F. G. Schaupp.) [Academy of Natural Sciences of Philadelphia.]

Description of Female.—Very unlike male, apterous, size much larger, form broad ovate. Dorsal surface rugulose, covered with very short, but stout, minute reddish hairs, these longest along the margins of the body, particularly cephalad. Pronotum moderately broad, cephalic margin evenly arcuate at an angle of less than 90°, caudal margin almost transverse, very weakly produced mesad, with sides showing a slight concavity. Supra-anal plate transverse, weakly trapeziform; caudal margin weakly convex laterad, with mesal fifth subtruncate, showing an indication of mesal emargination. Subgenital plate very large, roundly produced mesad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Round Mountain, Texas(3)	15.4–17.5	5.1–5.3	7.7–8	20.3–21	7.4–7.8
Carrizo Springs, Texas. (9)[361]	13.5–18	4.2–5.7	6–8.7	16.6–22	6.2–8.8
Brownsville, Texas....(9)	14.8–15.3	4.6–4.9	6.4–6.8	16.9–17.6	6.3–6.4
Jemez Springs, New Mexico.....(3)	13.5–16.5	4–4.7	5.4–6.6	17.8–20.8	7–7.8
Roebles Ranch, Arizona(3)	15–15.8	4.4–4.6	6.4–6.7	18.3–19.2	6.8–7.1
Phoenix, Arizona.....(8)	13–15	3.8–4.7	5.3–6.2	15–17.7	5.7–6.8
Cottonwood, California	13.8	4	5.8	15	6

[361] A single male furnishes the maximum measurements given, the others approximate much more closely the minimum.

♀		Length of body	Length of pronotum	Width of pronotum	Width of mesonotum	Width of metanotum
Round Mountain, Texas		16	5.4	8.6	11	11.6
Carrizo Springs, Texas.	(6)	13.8–15.3	4.8–5.3	6.8–7.8	8.7–9.7	9.4–10.6
Sabinal, Texas.....	(4)	13.8–14.8	5–5.2	6.7–7.9	8.9–9.5	9.7–10.3
Albuquerque, New Mexico.....		11.4	4.7	6.5	8	8.6
Adamana, Arizona....		12.8	5.2	8	9.7	10
Chiricahua Mountains, Arizona.....		14.7	5.7	8.5	9.9	10.6

Coloration.— ♂. This sex shows less color variation than in other species of the genus. General coloration ochraceous-buff. A brown, shield-shaped marking is situated meso-caudad on the pronotum, this is normally finely and weakly marked with a darker shade (a conspicuous development of this darker pattern giving the allied *apacha* a distinctive pictured appearance). In rare specimens of extreme recessive coloration, this blotch becomes very pale, with no darker markings whatever. In specimens of extreme intensive coloration it becomes dark brown, the markings again disappearing. In the other species of the genus, we find, in the maximum of intensive coloration, that the homologous pronotal blotch expands, covering all but the cephalic margin of the pronotum; this does not appear in any of the very large series of *erratica* now before us.

♀. General coloration, above tawny to burnt umber, the cephalic margin of the pronotum usually vaguely paler, all but the darkest individuals faintly maculate on the pronotum, mesonotum and metanotum with a darker shade, and laterad a spot of this same color is found, with rare exceptions, in the series before us, on each abdominal segment both above and below. Minute hairy covering tawny. Underparts, particularly head and limbs, somewhat paler.

This species is known to range from Waco, south to Goliad and Brownsville, Texas. Westward the most northern localities are Ballinger, Texas; Durango, Colorado; Mescalero Apache Reservation and Jemez Hot Springs, New Mexico; Adamana and Winslow, Arizona, and St. George, Utah; while in California the species is known only from single records—Cottonwood and Riverside. The species undoubtedly has an extensive distribution in Mexico,

but is there unknown aside from our single record for the state of Sonora.

Specimens Examined: 252; 133 males, 39 females and 80 immature individuals.

Waco, Texas, V, 8 to VII, 16, (Belfrage), 4 ♂, [M. C. Z. and Hebard Cln.].

Bosque County, Tex.. (Belfrage), 1 ♂, [M. C. Z.].

Ballinger, Tex., (H. Pinkus; at light), 1 ♂, [U. S. N. M.].

Shovel Mountain, Burnet County, Tex., IX, 10, 1901, (F. G. Schaupp), 1 ♂, 1 ♀, [A. N. S. P.].

Austin, Tex., II, 19, 1903, (W. M. Wheeler), 2 ♀,[362] [A. N. S. P. and Hebard Cln.]; (W. M. Wheeler), 2 ♀, 1 juv. ♂, [Am. Mus. Nat. Hist.].

Round Mountain, Tex., (F. G. Schaupp), 3 ♂, 1 ♀,[363] [A. N. S. P.].

Georgetown, Tex., (E. Palmer; in cave), 5 ♂, 3 ♀, 5 juv. ♂, [M. C. Z., Hebard Cln. and A. N: S. P.].

Goliad, Tex., VII, 28, (R. A. Cushman), 2 ♂, [U. S. N. M. and Hebard Cln.].

Brownsville, Tex., IV, 30, 1895, (C. H. T. Townsend), 4 ♂, [U. S. N. M.].

Kerrville, Tex., IV, 11, 1907, (F. C. Pratt; at light), 5 ♂, [U. S. N. M. and Hebard Cln.].

San Antonio, Tex., IX, 18 to 27, (E. Palmer), 5 ♂, 2 ♀, [M. C. Z. and Hebard Cln.].

Cotulla, Tex., IV, 18, 1906, (F. C. Pratt), 1 juv. ♀; V, 12, 1906, (Crawford and Pratt), 2 ♂, [all U. S. N. M.].

Esperanza Ranch, Brownsville, Tex., V, 22 and VI, 19, (C. Schaeffer), 2 ♂, [A. N. S. P. and Hebard Cln.].

Sabinal, Tex., V to VI, 19, 1910. (Pratt and Pierce), 3 ♂, 4 ♀, 2 juv. ♂, 2 juv. ♀, [U. S. N. M. and Hebard Cln.].

Knippa, Tex., VII, 3, 1910, (F. C. Pratt), 1 juv. ♂, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 9 ♂, 6 ♀, 4 juv. ♂, 8 juv. ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Ringgold Barracks, [near Rio Grande], Tex., (Schott), 1 ♂, [M. C. Z.].

Devils River, Tex., V, 4, 1907, (F. C. Pratt), 1 juv. ♂, [U. S. N. M.].

Hackberry Creek, Boquillas Road, Brewster County, Tex., IX, 2, 1912, (Rehn and Hebard; attracted to camp fire during two hours), 3 ♂, [Hebard Cln. and A. N. S. P.].

Chisos Mountains, VI, 10 to 12, 1908, (Mitchell and Cushman), 1 ♀, 1 juv. ♀, [U. S. N. M.]; VII, 16, 1911, (H. A. Wenzel), 2 ♂, [A. N. S. P.].

El Paso, Tex., IV, 4, 1899, (H. Solton), 1 juv. ♂; VIII, (G. W. Dunn), 1 ♂, [all Hebard Cln.].

Durango, Colorado, (E. J. Oslar), 1 ♂, [U. S. N. M.].

Mescalero Apache Reservation, New Mexico, X, 2, 1896, (T. D. A. Cockerell), 1 juv. ♂, [M. C. Z.].

[362] Incorrectly recorded by Rehn as *bolliana*. Proc. Acad. Nat. Sci. Phila., 1903, p. 187, (1903).

[363] Incorrectly recorded by Rehn as *bolliana*. Trans. Am. Ent. Soc. xxvii, p. 331, (1902). Proc. Acad. Nat. Sci. Phila., 1903, p. 187, (1903).

Highrolls, Sacramento Mountains, N. M., VI, 23, 1902, (H. L. Viereck), 1 juv. ♂[364], [A. N. S. P.].

Jemez Hot Springs, N. M., VII, 29 to IX, 2, 1913 and 1915, (J. Woodgate), 3 ♂, [Hebard Cln.].

Albuquerque, N. M., V, 1905, (W. M. Wheeler), 1 ♀, [M. C. Z.]; (H. Wickham). 1 juv. ♀, [U. S. N. M.].

Las Cruces, N. M., IX, 1895, (T. D. A. Cockerell; at light[365]), 4 ♂, [M. C. Z. and Hebard Cln.].

Deming, N. M., VII, 18 to 20, 1907, (Rehn and Hebard; at light), 11 ♂, [Hebard Cln.].

Sheridan Canyon, Hachita Grande Mountains, N. M., (H. A. Pilsbry), 1 ♂, [A. N. S. P.].

Adamana, Arizona, VII, 22, 1907, (Miss Stella McSaws), 1 ♀, [Hebard Cln.].

Winslow, Ariz., (H. Wickham), 1 juv. ♂, [Hebard Cln.].

Fort Grant, Graham County, Ariz., 1882, 3 ♂, [U. S. N. M. and Hebard Cln.].

San Simon, Ariz., V, 7, (H. G. Hubbard), 1 ♂, [U. S. N. M.].

Paradise, Ariz., VIII, 10, 1915, (O. C. Poling), 2 ♂, [Hebard Cln.].

Chiricahua Mountains, Ariz., 1 ♀, 1 juv. ♀, [A. N. S. P.].

Roosevelt, Ariz., 2 ♂, [Cornell Univ. and Hebard Cln.].

Redington, Ariz., 1 ♂, [U. S. N. M.].

Lowell Ranger Station, Pima County, Ariz., VII, 6 and 20, 1916, (Lutz and Rehn), 5 ♂, [A. M. N. H. and A. N. S. P.].

Sabino Basin, Santa Catalina Mountains, Arizona, VIII, 15 to 21, 1916, (Lutz), 3 ♂, 1 ♀, [A. M. N. H. and A. N. S. P.].

Sabino Canyon, Santa Catalina Mountains, Ariz., II, 22 to III, 15, 1916, (J. F. Tucker), 6 ♀, 44 juv.; VI, 5 to XI, 2; 1915 and 1916, (J. F. Tucker), 4 ♂ [all Hebard Cln.].

Tucson, Ariz., (H. Wickham), 1 ♀, [Hebard Cln.]; VII, 21 to 23, 1916, (Lutz and Rehn), 1 ♂, [A. M. N. H.].

San Xavier, near Tucson, Ariz., VII, 24, 1916, (Lutz and Rehn), 2 ♂, [A. M. N. H. and A. N. S. P.].

Snyder's Hill, Pima County, Ariz., c. 2500 feet, X, 11, 1910, (Rehn and Hebard; attracted to camp fire), 1 ♂, [Hebard Cln.].

Roebles Ranch, Pima County, Ariz., VIII, 13, 1916, (Lutz and Rehn), 2 ♂, [A. M. N. H. and A. N. S. P.]; X, 5, 1910, (Rehn and Hebard; attracted to camp fire), 3 ♂, [Hebard Cln. and A. N. S. P.].

Palo Alto Ranch, Pima County, Ariz., VII, 29 and 30, 1916, (Lutz and Rehn), 1 ♂, [A. M. N. H.].

Coyote Mountains, Ariz., VIII, 4 to 7, 1916, (Lutz and Rehn), 1 ♀, [A. M. N. H.].

[364] Incorrectly recorded and described by Rehn as immature *subdiaphana*. Proc. Acad. Nat. Sci. Phila., 1903, pp. 190 to 191, (1903).

[365] One specimen incorrectly recorded by Scudder and Cockerell as *bolliana*. Proc. Davenport Acad. Sci., ix, p. 19, (1901).

: Rincon, Baboquivari Mountains, Ariz., VIII, 7 to 9, 1916, (Lutz and —— 2 ♂, [A. M. N. H. and A. N. S. P.].

S——iz Village, Comobabi Mountains, Ariz., VIII, 10 to 12, 1916, (Lutz and ——r, 1 ♂, [A. M. N. H.].

Prescott, Ariz., VI, 10, 1902, (E. J. Oslar), 2 ♂, *type, paratype*, [A. N. S. P.].

Florence, Ariz., VI, 8, 1903, (C. R. Biedernan), 1 juv. ♂; VII, 17 to 22, 1903, (C. R. Biederman), 11 ♂, [A. N. S. P.].

Phoenix, Ariz., VI, 17, 1892, (A. B. Cordley), 1 ♂; VIII, 1890, 1 juv. ♂; IX, 14 to X, 9, 1903 and 1904, (R. E. Kunzé), 7 ♂, [Hebard Cln. and A. N. S. P.].

Fort Mojave, Ariz., III, 25, 1911, 1 ♂, [Hebard Cln.].

Yuma, Ariz., VII, 27, 1907, (Rehn and Hebard; at light), 1 ♂, [Hebard Cln.].

St. George, Utah, 1875, (E. Palmer), 4 ♀, 1 juv. ♂, 1 juv. ♀, [M. C. Z. and Hebard Cln.].

Cottonwood, California, 2274 feet, IX, 9, 1907, (Hebard; at light on train), 1 ♂, [Hebard Cln.].

Riverside, Cal., (H. Wickham), 1 ♀, [Hebard Cln.].

Sonora, Mexico, 1 ♂, [Hebard Cln.].

Arenivaga apacha (Saussure) (Plate IX, figures 14 to 16.)

1893. [*Homoeogamia*] *apacha* Saussure, Rev. Suisse Zool., i, fasc. 2, p. 296. [♂; Chihuahua, Mexico.]

1905. [*Homoeogamia*] *apacha infuscata* Caudell, Proc. U. S. Nat. Mus., xxviii, pp. 462 to 463. [♂; Phoenix, Arizona.]

Comparison of this species with its nearest ally, *A. erratica*, is made under that species.

Normally the shield-shaped dark blotch of the pronotum in males of this species is sharply defined, with darker markings decided, strongly pictured; however, very great color variation is shown, specimens of maximum recession being paler than the normal condition of *erratica*, with shield-shaped blotch greatly reduced and no darker markings. A number of specimens of the maximum intensive coloration have all but the cephalic margin of the pronotum very dark brown, the tegmina, excepting the pale marginal field, being of the same shade, with a few dots of the paler color. This condition has been named *infuscata;* as it merely indicates a certain degree of color variation, we place the name in synonymy.

In addition to the characters given in the key, the following features are of diagnostic value in the male. Though the width between the eyes is normally subequal to that between the ocelli, several specimens before us have this dimension appreciably less. Concealed genital hook and dextro-dorsal genital plate as in *errat-*

ica. The dextro-ventral concealed genital plate is a smooth, somewhat convex, chitinous plate, from the inner side of which springs a long, heavy, chitinous spike, directed toward the inner extremity of the dextro-dorsal plate.

The female of *apacha*, described by Saussure and Zehntner[366] as possibly immature, was in all probability adult. This sex of the present species is very similar to females of *erratica*. The dorsal surface is somewhat more hairy, with margin, particularly in cephalic portion, bearing more and longer hairs. The limbs are shorter and stouter, this particularly apparent in the tibiae. The abdominal segments are unicolorous above and below, no trace of spots being found as is frequent in *erratica*. It would be ill-advised in our opinion, however, to attempt to determine unique females of the species without attendant males, unless the student has a first-hand knowledge of this sex of both *apacha* and *erratica*.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Phoenix, Arizona	(7)	10.5–12.1	3.6–4.2	5–6	13.1–16.8	5.1–6.4
Fort Grant, Arizona	(2)	11–14.9	3.8–4.1	4.8–6	13.3–17.7	5.1–6.1
Kern County, California		15	4.4	6.2	17	6.5
Strawberry Valley, California		16.3	4.9	6.6	17	6.7
San Diego, California		10.9	3.5	4.7	14.1	5
♀					Width of mesonotum	Width of metanotum
Ehrenberg, Arizona		12.8	5.1	7.1	8.8	9.4
Fresno County, California		13	5.3	7.8	10	10.7
Death Valley, California		12.9	5.3	8.1	9.3	9.9
Palm Springs, California		14.6	6	9	10.7	11.3
Sonoita, Sonora, Mexico.		12.8	6.1	9	10.8	11.1

The length of the caudal tibia in this series of females ranges from 4 to 4.6 mm.

Coloration.—♂. (Maximum recessive.) General coloration light ochraceous-buff. Head with eyes and face blackish brown; ocelli weakly zinc orange; clypeus, including the prominent bilobate portion, light ochraceous-buff. Limbs and ventral surface ochraceous-buff. Pronotum light ochraceous-buff, disk ochraceous-buff, with a picturing of tawny. Tegmina transparent, faintly

[366] Biol. Cent.-Amer., Orth., i, p. 108, (1894).

tinged with light ochraceous-buff. Wings transparent, clear, with a narrow, opaque, buffy area meso-distad on the costal margin. (Maximum intensive.) Head with eyes and face blackish brown; ocelli, clypeus, limbs and ventral surface light ochraceous-buff. Pronotum blackish chestnut brown, except for a broad band of light ochraceous-buff, which extends along the cephalic margin to, and including, the latero-caudal angles. Tegmina transparent, heavily suffused with blackish chestnut brown, which shows small, irregular, almost colorless blotches, excepting marginal fields, which are light ochraceous-buff. Wings transparent, suffused with blackish chestnut brown, showing in anterior field blotches similar to those of the tegmina. Every gradation between these extremes is shown by the material before us. In the frequent examples showing a color condition about intermediate between the extremes, the pronotal picturing is, in the present species, usually sharply defined in dark brown. The wings frequently have a narrow brown line running across the mesal portion of the anterior and posterior fields, this line is sometimes tawny. The posterior field of the wings is weakly iridescent, sometimes decidedly so.

♀. Dorsal surface immaculate russet, slightly paler toward the cephalic margin of the pronotum. Hairy covering coppery. Head, ventral surface, coxae and femora weak ochraceous-tawny. Tibiae and tarsi darker, with spines deep mars brown. Ventral surface of abdomen russet.

This species has been recorded from Nogales, Arizona, in addition to the localities given below.

Specimens Examined: 78; 56 males, 6 females and 16 immature individuals.

Fort Grant, Graham County, Arizona, 1 ♂, [Hebard Cln.].

Huachuca, Ariz., (R. E. Kunzé), 1 ♂, [Hebard Cln.].

Oracle, Ariz., VII, 10 to 23, 2 ♂, [U. S. N. M. and Hebard Cln.].

Catalina Springs, Ariz., VII, 4, 1 ♂, [U. S. N. M.].

Lowell Ranger Station, Pima County, Ariz., 2550 feet, VII, 6 and 20, 1916, (Lutz and Rehn), 4♂, [A. M. N. H. and A. N. S. P.].

Sabino Canyon, Santa Catalina Mountains, Ariz., II, 25 to XI, 2, 1915 and 1916, (J. F. Tucker), 4 ♂, 4 juv., [Hebard Cln.].

Tucson, Ariz., XII, 23, 1896, (H. G. Hubbard; from nest of wood rat, *Neotoma* sp.), 1 ♂, [U. S. N. M.].

Santa Rita Mountains, Ariz., VI, 15 to VII, 7, (E. A. Schwarz), 4 ♂, [U. S. N. M. and Hebard Cln.].

Coyote Mountains, Ariz., VIII, 4 to 7, 1916, (Lutz and Rehn), 2 juv., [A. M. N. H. and A. N. S. P.].

Kits Peak Rincon, Baboquivari Mountains, Ariz., about 4050 feet, VIII, 1 to 4, 1916, (Lutz and Rehn), 6 ♂, [A. M. N. H. and A. N. S. P.].

Sycamore Canyon, Baboquivari Mountains, Ariz., c. 3700 feet, X, 6 to 9, 1910, (Rehn and Hebard; attracted to camp fire), 1 ♂, [Hebard Cln.].

Phoenix, Ariz., IV, 9 to 29, 1902, (Oslar; Kunzé), 3 ♂, [A. N. S. P.]; VI, 7 to VII, 1, 1904, (R. E. Kunzé), 3 ♂, [Hebard Cln.]; VII, 16 to 18, (H. Wickham) 1 ♂, [Hebard Cln.].

Tempe, Ariz., IV, 26, 1902, (E. J. Oslar), 1 ♂, [A. N. S. P.].

Florence, Ariz., VI, 8 to VII, 21, 1903, (C. R. Biederman), 12 ♂, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Ehrenberg, Ariz., (E. Palmer), 2 ♂, 1 ♀, [M. C. Z. and Hebard Cln.].

Yuma, California, (H. Wickham), 1 ♂, [Hebard Cln.].

Death Valley, Cal., IV, 1891, (A. Koebele), 1 ♀, [Hebard Cln.].

Fresno County, Cal., (A. E. Bush; in moist ground), 1 ♀, [U. S. N. M.].

Monterey, Cal., VII, 12, (E. A. Schwarz), 1 juv. ♀, [U. S. N. M.].

Kern County, Cal., V, 1 ♂, [Hebard Cln.].

Lancaster, Cal., VIII, 10, (H. Wickham), 1 ♀, [Hebard Cln.].

Mount Wilson, Los Angeles County, Cal., VIII, 10, 1909, (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

Claremont, Cal., 1 ♂, [U. S. N. M.].

Salton, Cal., −265 feet, VIII, 20, (H. Wickham), 2 juv. ♂, 4 juv. ♀, [U. S. N. M. and Hebard Cln.].

Palm Springs, Cal., II, 7, (H. G. Hubbard), 1 juv. ♀, [U. S. N. M.]; III, 19, (Hubbard and Schwarz), 1 ♀, [Hebard Cln.].

Strawberry Valley, San Jacinto Mountains, Cal., III, 4, 1910, (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

San Diego, Cal., (G. R. Crotch), 1 ♂, [Hebard Cln.].

La Sierra de San Francisco, Sonoita, Sonora, Mexico, 1 ♀, 1 juv. ♀, [M. C. Z. and Hebard Cln.].

EREMOBLATTA Rehn

1903. *Eremoblatta* Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 181.
1913. *Eremoblatta* Caudell, Proc. U. S. Nat. Mus., xliv, p. 605.

GENOTYPE, by monotypy: *Eremoblatta subdiaphana* [*Homoeogamia subdiaphana*] (Scudder).

This genus differs from *Homoeogamia* and *Arenivaga* in the entirely unarmed femoral extremities; the eight, instead of nine, spines of the cephalic tibiae; the seven, instead of six, apical spines of the median and caudal tibiae, and the decidedly more hairy covering (this latter feature being distinctly more pronounced in the female); in the male, the tegmina are distinctly glossy, the

supra-anal plate is not decidedly produced, the genital hook is curved outward and the subgenital plate is extraordinarily specialized; in the female, the tarsal joints of the caudal limbs scarcely reach beyond the apices of the distal caudal tibial spines.

The species of this genus are small. Both sexes are more hirsute than in *Arenivaga* and, as in that genus, the apterous females show this feature to a decidedly greater degree than the males.

Eremoblatta subdiaphana (Scudder) (Plate IX, figures 17 to 20.)

1902. *Homoeogamia subdiaphana* Scudder, Proc. Davenport Acad. Sci., ix, p. 19. [♂; Las Cruces, New Mexico.]

1909. *Homoeogamia subdiaphana mohavensis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 415. [♂; Cottonwood, California.]

This insect, by the numerous generic characters given above, may be readily separated from the species of *Arenivaga*. In addition, the decidedly glassy tegmina, which even in specimens of the maximum intensive coloration are never maculate, and the less oblique discoidal sectors, give males of the present species a distinctive appearance when compared with any other species of the subfamily here considered.

The maximum of recessive coloration is found in material of this species from the Gila-Mojave Desert region; and as the name *mohavensis* was proposed for this condition, we consistently place it in the synonymy here.

The following features are observed in the male sex.

(Alamogordo, New Mexico.) Interocular width slightly greater than that between the ocelli, rarely these dimensions are subequal. Ocelli decidedly produced, with face below these very deeply concave. Pronotum transverse, with cephalic margin broadly, and caudal margin weakly, convex. Tegmina with a decided glassy luster. Discoidal sectors of tegmina weakly oblique. Supra-anal plate transverse, deplanate and weakly produced between the cerci, with distal margin weakly convex. Immediately above the cerci, on each side, a narrow, transverse portion of this plate is convex and thickly covered with hairs. Cerci short, not articulate, proximal half stout; distal half abruptly narrower, directed at an angle to the proximal portion, more delicate in structure and irregularly rounded. Concealed genital hook elongate, base soft, becoming gradually corneous, proximal portion tubular, straight, curving slightly inward distad; distal portion flattened, tubular, curving regularly and sharply outward, not enlarged, with sharp apex directed proximad. From the base of this organ another soft integument is produced inward, becoming corneous distad, in the form of an elongate, sharp spike, which organ is of nearly equal length to the genital hook. Dextro-dorsal concealed genital plate small,

weakly creased mesad, suggesting bilobation. Dextro-ventral concealed genital plate a large, convex, corneous plate, with distal margin briefly flattened, convex in outline. Subgenital plate produced, asymmetrical, quite deeply arcuato-emarginate latero-mesad, sinistral production rectangulate and sharply rounded, dextral production acute and sharply rounded, projecting slightly more distad. Distal surface of plate armed with minute, scattered, short, sharp spines, directed cephalad. Proximad the surface of the plate, near the sinistral margin, forms a convex ridge, produced cephalad over the preceding segment with margin rounded, this area covered thickly with minute, short, sharp spines, directed cephalad; from beneath this projection a similar development is continued on the preceding segment, bearing a distal fringe of slightly stouter spines. Femora wholly unarmed, clothed, particularly along the ventral margins, with very fine, long hairs.

As the female was hitherto unknown, we here describe a topotypic female before us.

♀; Las Cruces, Donna Ana County, New Mexico. (T. D. A. Cockerell.) [Museum of Comparative Zoology.]

Description of Female.—Very unlike male, apterous, size larger, form subor bicular Eyes even more decidedly reduced than in females of the genus *Arenivaga*, not extending over the antennal sockets. Head with clypeal swelling extending from the very narrow, flattened, distal margin of clypeus to a line drawn across the face just above the antennal bases. Dorsal surface finely punctulate, heavily clothed with hairs, these longest on the margins, particularly latero-caudad (in greatest length 1.7 mm.). Pronotum weakly transverse, cephalic margin arcuate, nearly forming a semicircle, caudal margin very weakly convex produced mesad, with sides broadly but weakly concave. Supra-anal plate strongly transverse, trapeziform, with distal angles rounded. Subgenital plate rather large, weakly produced mesad, with distal margin convex. Cephalic femora with ventro-cephalic margin bearing a few stout, very short, rather closely placed teeth proximad, succeeded in distal two-thirds by a weakly arcuate row of very widely spaced, stout, very short, knob-like spines; other ventral femoral margins frequently supplied with a very few scattered, even smaller but similar, blunt, knob-like spines; all femora very hairy.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Alamogordo, New Mexico	(8)	10.1–11.8	3.2–3.6	4.5–4.9	13.7–15.2	5.1–5.8
Sentinel, Arizona	(5)	9.3–10.8	3.1–3.6	4–5.1	13.2–14.7	5–5.9
Yuma, Arizona	(2)	9–9.5	2.9–3.1	4.1–4.4	11.8–12.2	4.7–4.9
Brown, California		12.3	3.7	4.8	14.9	5.7
Cottonwood, California	(3)	9.2–11.4	3–3.1	4.1–4.2	12.2–14.8	4.6–5.8
Palm Springs, California		10.7	3.6	4.7	14.1	5.8

♀		Length of body	Length of pronotum	Width of pronotum	Length of mesonotum	Length of metanotum
Las Cruces, New Mexico.						
Described specimen..		9.7	4.3	5.3	7	7.3
Mesilla Park, New Mexico.....	(2)	8.7–11	4.2–5	5.3–6	6.9–7.1	7–8

As in the species of *Arenivaga*, the size variation in this insect appears to be wholly attributable to local environmental factors.

Coloration.—♂. In the maximum intensive type of coloration the pronotum has the cephalic margin pale, this narrowest in the brief mesal portion, on each side of which an invasion into the dark brown of the remaining portion of the pronotum is weakly indicated. In one of the darkest specimens before us, the pronotum has two large latero-caudal blotches of vinaceous rufous. In such dark material, the tegmina and wings are also darkened, but not maculate, nor is their transparency lessened. The material before us shows varied gradations from this type to the maximum of recessive coloration, in which the entire insect is light buff, the pronotum clouded latero-caudad with ochraceous-buff.

♀. Mars brown or russet above, heavily clothed with ochraceous-buff hairs.

The insect is apparently to be found in its greatest abundance in the extreme desert condition of the Southwest. Dr. Wheeler found males flying across the desert in small swarms on March 10, 1911, at Yuma, Arizona; all of the material seen by us was likewise of the male sex, attracted to lights at night.

Specimens Examined: 29; 25 males and 4 females.

Albuquerque, New Mexico, VI, 22 and VIII, 7, 1912, (Merrill), 1 ♂, 1 ♀, [Somes Cln.].

Las Cruces, N. M., (T. D. A. Cockerell; at light), 1 ♂, *type;* (T. D. A. Cockerell), 1 ♀, [both M. C. Z.].

Alamogordo, N. M., IV, 11 to VI, 6, 1902, (Rehn and Viereck; majority at light), 8 ♂, [A. N. S. P. and Hebard Cln.].

Mesilla Park, N. M., I, 1900, (C. Thompson), 1 ♀, [U. S. N. M.]; (C. N. Ainslie), 1 ♀, [Hebard Cln.].

Las Vegas, Nevada, 2050 feet, VIII, 9, 1907, (Hebard; at light), 2 ♂, [Hebard Cln.].

Maricopa Divide, Maricopa County, Arizona, X, 2, 1910, (Hebard; attracted to light on train), 2 ♂, [Hebard Cln.].

Sentinel, Ariz., X, 2, 1910, (Rehn and Hebard; attracted to station lamp), 5 ♂, [Hebard Cln. and A. N. S. P.].

Yuma, Ariz., III, 10, 1911, (W. M. Wheeler; ant guest), 1 ♂, [A. N. S. P.].

Brown, Kern County, California, X, 5, 1909, (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

Cottonwood, San Bernardino County, Cal., 2274 feet, IX, 9, 1907, (Hebard; attracted to light on train), 3 ♂, [Hebard Cln. and A. N. S. P.].

Palm Springs, Cal., 450 feet, IX, 29, 1910, (Hebard; attracted to light), 1 ♂, [Hebard Cln.].

Eremoblatta hirsuta new species (Plate IX, figures 21 and 22.)

Closely related to *E. subdiaphana;* readily separated by the proportionately deeper pronotum and heavier clothing of hair in both sexes, a male genital character and tegmina moderately glassy, with discoidal sectors longitudinal in that sex, and by the narrower clypeal swelling in the female. The male also appears to have the eyes wider apart and the face more deeply cleft between and below the ocelli, but these features can not be exactly determined, as some distortion has taken place from immersion in alcohol.

Type.— ♂; Sierra El Tosti, Lower California, Mexico. October, 1893. [Hebard Collection Type no. 409.]

Description of Type.—Size relatively very small, form acute elliptical. Head with width between eyes decidedly greater than that between the ocelli, which latter are very large and prominent, with face between and below these very deeply cleft. Pronotum very deep, proportionately much less transverse than in *subdiaphana*, cephalic margin roundly angulate mesad at slightly less than 90°, caudal margin weakly convex, surface of pronotum covered with minute hairs, cephalic margin more thickly clothed with much longer hairs (in greatest length 1.2 mm.). Tegmina less elongate than in *subdiaphana*, discoidal sectors longitudinal, parallel to both costal and sutural margins, proximal surface of tegmina supplied with scattered, minute hairs. The genitalia are of the peculiar and complex nature of *subdiaphana*, differing only in the appendage situated beside the concealed genital hook, which is of different shape—proximad broad and subchitinous, distad produced in a brief, chitinous spine, less than half as long as is this projection in *subdiaphana*.

Allotype.— ♀; San José del Cabo, Lower California, Mexico. [Hebard Collection.]

Description of Allotype.—Very similar to this sex of *subdiaphana*. Clypeal swelling narrower, extending from the slightly broader, flattened, distal margin of the clypeus to a line drawn across just below the antennal bases. Pronotum proportionately

irs heavier and longer (greatest length 2 mm., fringing abdomen latero-
Supra-anal and subgenital plates as in *subdiaphana*.

lition to the type and allotype, two females from San José
), may be considered paratypes.

Measurements (in millimeters)

	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Width of mesonotum	Width of metanotum
Sierra El Tosti, Lower California, *type*, ♂	9	3.3	4	9.6	3.4	—	—
San José del Cabo, Lower California, *allotype*, ♀	11.6	5.7	6.7	—	—	7.8	8.7
San José del Cabo, Lower California, *paratype*, ♀	10	5	5.8	—	—	7	7.8
San José del Cabo, Lower California, *paratype*, ♀	9.6	4.7	5.1	—	—	6	6.7

Coloration.—♂. Entirely shining fuscous black, excepting a brief, narrow, cream buff marking on the pronotum on each side of the cephalic angle, these markings with inner margin convex. Hairy covering golden, giving this insect a remarkable sheen in certain lights. Tegmina transpar nt, heavily suffused, particularly proximad. Wings transpare t, moderately suffused; distal portion of posterior field strongly iridescent.

♀. Bister above, thickly covered with even more striking golden hairs. Limbs clay color, becoming darker distad toward the heavy mahogany colored spines.

Specimens Examined: 13; 1 male, 5 females, 2 immature males and 5 immature females.

Sierra El Tosti, Lower California, Mexico, X, 1893, 1 ♂, *type*, [Hebard Cln.]. (Dried alcoholic.)

Comondu, L. Cal., Mex., III, 1889, (C. D. Haines), 1 juv. ♀, [Hebard Cln.].

San José del Cabo, L. Cal., Mex., 3 ♀, *allotype*, *paratypes*, 2 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

Cape San Lucas, L. Cal., Mex., 2 ♀, *paratypes*, 3 juv. ♀, [M. C. Z. and Hebard Cln.].

Subfamily OXYHALOINAE

The present subfamily is separated into three divisions; each of which have been given subfamily rank by Kirby, as the Choriso-

neurinae, Oxyhaloinae and Plectopterinae. At the present time we do not feel justified in recognizing these, the character of the folding of the distal portion of the wings being the most important factor available for their separation, which, in itself, does not appear to warrant such action.[367]

Of the subfamily showing few or no spines on the ventral femoral margins, the Oxyhaloinae are readily separable from the preceding two, the Corydiinae and Polyphaginae, by having the wings, when present, with anal area folding fanwise, in this respect agreeing with the Panchlorinae and Blaberinae, in which subfamilies the wings are found to have the ulnar vein with numerous incomplete rami and an intercalated area subobsolete or absent.

The forms of the Oxyhaloinae never develop the very heavily chitinous and robust condition typical of the two succeeding subfamilies, the Perisphaerinae and Panesthinae.

The following features are considered diagnostic. Head broad, ocelli indicated by spots or wholly absent. Pronotum and tegmina without hairs. Tegmina with venation distinct; with, or without,[368] strongly developed intercalated triangle,[369] or appendicular field.[370] Subgenital plate of females simple, or with a medio-longitudinal, linear cleft distad. Limbs, excluding ventro-caudal margins of caudal femora, which are entirely unarmed, with ventral margins unarmed except for single distal spines.[371] Median and caudal femora with a dorsal genicular spine. Tarsi with first four joints,[372] or fourth joint alone,[373] supplied with a large pulvillus. Large arolia present.

[367] The wings are developed as follows. The genus *Oxyhaloa* shows no distal field, while the evidently allied *Diploptera* shows a greatly developed, reflexed, appendicular field. The genus *Chorisoneura* and its allies show a decided, reflexed, intercalated triangle, in some approaching an appendicular field. The genus *Plectoptera* and its allies show a reflexed, appendicular field.

[368] *Oxyhaloa* and allies.

[369] *Chorisoneura* and allies.

[370] *Diploptera* and *Plectoptera*.

[371] In a single apparently abnormal specimen of *Chorisoneura* before us, the ventro-cephalic margins of the cephalic femora have each two distal spines.

[372] *Oxyhaloa*, *Diploptera*.

[373] *Hypnorna*, *Chorisoneura*, *Plectoptera*.

CHORISONEURA Brunner

1865. *Chorisoneura* Brunner, Nouv. Syst. Blatt., p. 255.

Five species were originally included in the genus, one of these since proven a synonym of an older name. In addition to these, a large number of species have been subsequently described. The genus is apparently peculiar to America.

GENOTYPE: *Chorisoneura nigrifrons* [*Blatta nigrifrons*] (Serville), selected by Rehn, in 1903.[374]

Generic Description.—Head triangular, with angles rounded; eyes widely separated; ocellar areas not defined; ocellar spots absent; small but distinct rounded areas, with surface convex, are found meso-ventrad of antennal sockets; face decidedly flattened, weakly convex. Pronotum broad; disk with very weak impressions; lateral portions broad and scarcely declivent; lateral margins broadly convex; caudal margin truncate, nearly transverse. Tegmina delicate and narrow, tapering distad to the sharply rounded apex; veins distinct; discoidal sectors oblique. Wings with numerous costal veins, of which part are clavate distad; numerous transverse veinlets between discoidal and median veins; ulnar vein undivided, or with a single distal fork; intercalated triangle large and striking, in many species best termed an appendicular field. Sixth dorsal abdominal segment of male specialized mesad. Subgenital plate of male with styles situated mesad and produced in elongate scutes. Subgenital plate of female with a medio-longitudinal, linear cleft distad. Cephalic femora with ventro-cephalic margin supplied with a fringe of hairs, which are shorter and more closely set meso-distad,[375] terminating in a single elongate distal spine;[376] ventro-caudal margin unarmed. Median and caudal femora with ventral margins each supplied with a single elongate distal spine. Tarsi elongate, fourth tarsal joint alone supplied with a pulvillus, which is large, completely filling the brief ventral surface of this joint and roundly produced beyond. Large arolia present.

[374] Trans. Am. Ent. Soc., xxix, p. 280.

[375] These might well be termed chaetiform spines.

[376] A single exotic example of the genus before us is apparently abnormal; in this individual the ventro-cephalic margins of the cephalic femora have each two distal spines.

Chorisoneura texensis Saussure and Zehntner (Plate X, figures 7 and 8.)

1893. *Chorisoneura texensis* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 80. [♂: New Mexico;[377] Texas.]

1904. *Chorisoneura plocea* Rehn, Ent. News, xv, p. 184. [♀, Coast of South Carolina.]

Confusion in the description of the tegminal venation of *plocea*, and the ambiguity in the description of the costal veins of the wing in *texensis*, accounts for the above synonymy. The venation in tegmina and wings in the type of *plocea* agrees fully with the description of *texensis* and with Texan material of the species now, before us.[378]

The obtuse-angulation of the base of the appendicular field of the wings distinguishes this insect, from all the other species of the genus we have been able to examine.

Characters of Male.—(Esperan za Ranch, Brownsville, Texas.) Size medium small form moderately broad for the genus. Head immaculate in coloration; width about equal to length; interocular space slightly narrower than the broad space between the antennal sockets. Pronotum subelliptical, with caudal margin (usually) almost transverse, very weakly convex. Tegmina with margins distad convergent and moderately convex to apex; discoidal sectors (10 to 13 in series) rather strongly oblique, the great majority springing from the median vein. Wings with numerous (10 to 13 in series) costal veins, of which the more proximal (6 to 8 in series) are heavily clavate distad; discoidal and median vein connected by (6 to 8 in series) transverse veinlets; ulnar vein unbranched; axillary vein with two branches, these run to near the caudal angle of the appendicular field; appendicular field with base forming an angle of slightly more than 90°, width of field slightly greater than length. Sixth dorsal abdominal segment with a rounded meso-cephalic area, thickly supplied with agglutinated hairs, which lie flat and are directed caudad.[379] Supra-anal plate strongly transverse, caudal margin weakly convex. Cerci elongate fusiform, depressed (usually composed of nine joints). Subgenital plate small, with distal margin briefly concave to two slender, adjacent, mesal scutes (styles) which, converging, become contiguous distad; between the bases of these is a small, slender, chitinous projection, closely pressed between the much longer scutes, which project dorsad to the apex of the supra-anal plate. Armament of limbs, pulvilli and arolia, as given in generic description.

[377] This New Mexican record suggests an error of some kind; the species has not been found, and, in our opinion, does not occur, in truly desert regions, nor has it ever been taken in the mountainous regions of the southwestern United States.

[378] The synonymy of *plocea* with *texensis* has been established by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 120, (1916).

[379] This area is inconspicuous and might easily be overlooked in the present species.

rac *of Female.*—(Esperanza Ranch, Brownsville, Texas.) Very similar to
ng in the following features. Dorsal surface of abdomen unspecialized.
plate transverse, medio-longitudinally sulcate, weakly triangularly pro-
apex incised. Subgenital plate large, distal portion rectangularly pro-
with a medio-longitudinal linear cleft to base of triangle thus formed,
d portion apparently flexible, bent strongly upward in this specimen.[380]

Measurements (in millimeters)

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
S ıd, Georgia	—	8.3	2.1	3	9.3	2.8
Jac ıorida	—	8.3	2.1	3.1	8.9	2.8
& Z.)	—	"9.5"	"2.25"	"3.2"	"9"	—
as	(6)	7.8–8	1.6–1.8	2.6–2.7	7.2–7.8	2.3–2.4
Coast of South Carolina	—	8.4	2.2	3.3	8.4	2.9
Atlantic Beach, Florida	—	7.4	1.8	3	7.7	2.9
Key Largo, Florida	—	8.2	2	3	7.6	2.8
Near Waco, Texas	—	8.2	2	3.2	8.6	2.8
Brownsville, Texas	(5)	7.3–7.7	1.7–1.9	2.4–2.7	6.8–7.3	2.4–2.5

The material from Brownsville a erages distinctly smaller than that from more northern Texas or ı om the Atlantic Coast. This is due either to geographic size variation, or local environmental conditions; other differences do not exist in the series. Saussure's Texan specimen, type of *texensis*, came from Boll and, in consequence, very probably from the vicinity of Dallas.

Coloration.—Disk of pronotum, head and abdomen, ochraceous-buff tinged with ochraceous-tawny, to weak ochraceous-tawny. Remaining portions of pronotum, marginal field of tegmina and portion of dextral tegmen, concealed when at rest, transparent, with a weak buffy tinge. Other portions of tegmina transparent, tinged with ochraceous-tawny. Wings hyaline, weakly iridescent, tinged with ochraceous-tawny in area of costal veins and in area of forks of axillary vein, near base of appendicular field. Eyes dark brown. Limbs ochraceous-buff. In one specimen (Marietta, Georgia) the head is pale but the pronotum has the disk narrowly

[380] In such specimens, frequent in the series before us, what would appear to be the distal margin of the plate is broadly transverse mesad, the triangularly projecting portions being concealed within the anal chamber.

suffused with dark brown laterad.[381] In another specimen (Brownsville, Texas) weak suffusions of darker brown are found on the head between the ocelli and on the genae,[382] and on the pronotum mesad on the disk.

Immature examples before us show two color conditions. In one (Lakeland and Key Largo, Florida), the general coloration is pale ochraceous-tawny, the lateral margins of the pronotum, mesonotum and metanotum transparent, with a weak buffy tinge. In the other (Thomasville, Georgia, and Natchez, Mississippi), the abdomen, and cerci are blackish chestnut brown, this darker coloration extending as narrow, lateral, submarginal, suffused bands to the cephalic margin of the pronotum, bordering the transparent margins and becoming narrower and weaker cephalad. The remaining portions are pale ochraceous-tawny.

Though widely distributed through the southeastern United States, we have never found this insect in numbers, rare individuals having been taken, in the majority of cases, by beating shrubbery.

Specimens Examined: 35; 15 males, 15 females and 5 immature individuals.

Tryon, North Carolina, VI, 19, (at light), 2 ♂, [U. S. N. M.].

Coast of South Carolina, (E. A. Smyth Jr.), 1 ♀, *type* of *C. plocea* Rehn, [Hebard Cln.].

Marietta, Georgia, VI, 7, 1909, 1 ♀, [A. N. S. P.].

St. Simon's Island, Ga., IV, 22 to V, 12, 1911, (J. C. Bradley), 3 ♂, 2 ♀, [Cornell Univ., A. N. S. P. and Hebard Cln.].

Thomasville, Ga., I, 10, 1903, (Hebard; undergrowth in pine woods), 1 juv. ♀, [Hebard Cln.].

Atlantic Beach, Fla., VIII, 25, 1911, (Rehn; beaten from bayberry bushes, *Myrica cerifera*, growing in and along edge of pine woods), 1 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Jacksonville, Fla., (Mrs. A. T. Slosson), 1 ♂, [M. C. Z.].

Orlando, Fla., IV, 14 and 16, 1916, (G. G. Ainslie; at light), 2 ♀, [Fox and Hebard Clns.]; VI, 7, 1907, (in nests of webworm), 1 ♀, [U. S. N. M.].

Lakeland, Fla., (G. G. Ainslie), 1 ♂, [Fox Cln.]; V, 5 and 8, 1912, (W. T. Davis), 1 ♀, 2 juv. ♂, [Davis and Hebard Clns.].

Key Largo, Fla., III, 18, 1910, (Hebard; in depths of jungle, beaten from lower branches of gumbo limbo and other trees and from the lower bushes and shrubs), 1 ♀, 1 juv. ♂, [Hebard Cln.].

[381] This, a decided intensive color condition for the species, is apparently due, in part, to the survival of the dark coloration found in some immature individuals.

[382] The head, however, never shows distinctive markings such as are conspicuous and of specific diagnostic importance in many forms of the genus.

Natchez, Mississippi, IX, 14, 1915, (Rehn; beaten from low oaks on hills), 1 small juv. ♂,[383] [Hebard Cln.].

Near Waco, Texas, (Belfrage), 1 ♀, [M. C. Z.].

Brownsville, Tex., (C. H. T. Townsend), 1 ♂, [Hebard Cln.]; VI, (F. H. Snow), 1 ♂, [A. N. S. P.]; VII, 1 ♂, [Bklyn. Inst.]; VII, 31, 1912, (Hebard; beaten from tall weeds, in opening in river plain jungle scrub), 1 ♂, [Hebard Cln.].

Esperanza Ranch, near Brownsville, Tex., VII, 30 to VIII, 2, 1904, (C. Schaeffer), 3 ♂, 4 ♀, [Bklyn. Inst., A. N. S. P. and Hebard Cln.].

PLECTOPTERA Saussure

1864. *Plectopera* Saussure, Mém. l'Hist. Nat. Mex., iv, p. 173, figure of wing.[384]

The genus is distinctive and widely separated from those showing nearest relationship. It is clear, however, from the form of the head, specialization of sixth dorsal abdominal segment in male, armament of limbs and presence of a single pulvillus on the fourth tarsal joint alone, that much closer relationship exists to *Chorisoneura* than has been generally supposed.

Two species were originally included in the genus. A number of species are now known, all of which are tropical American in distribution, the majority found in the West Indies.

GENOTYPE: *Plectoptera porcellana* [*Bl*[*atta*] *porcellana*] (Saussure), selected by Rehn, in 1903.[385]

Generic Description.—Form ovoid; dorsal surface convex, smooth and shining, suggesting certain forms of Coleoptera. Head triangular, with angles broadly rounded; eyes widely separated; ocellar areas not defined; ocellar spots absent. Maxillary palpi delicate; third joint much longer than fourth, fifth (distal) joint in length about intermediate between these. Pronotum convex, this strongest laterad; narrowly elliptical, with lateral portions broad; cephalic margin truncate, caudal margin weakly convex. Tegmina decidedly convex, smooth and shining, scarcely extending beyond apex of abdomen; median vein distinct, paralleling discoidal vein, from which latter spring numerous costal veins; oblique discoidal sectors weakly indicated near anal sulcus,[386] obsolete beyond. Wings very elongate; area of costal veins short and wide; a few (normally 4) costal veins, apparent only in certain lights; a

[383] Incorrectly recorded by Hebard as *Cariblatta lutea lutea*.

[384] Saussure's treatment of the genus is full and masterly.

[385] Trans. Am. Ent. Soc., xxix, p. 281.

[386] These veins can be seen only in certain lights.

number of weak, transverse veinlets run from the discoidal to the weak median vein; ulnar vein as heavy as discoidal vein, undivided almost to base of appendicular field, there connecting along that margin with the discoidal and anal veins; axillary vein similarly connected distad with the anal vein and reaching in the opposite direction nearly to the posterior angle of the appendicular field, axillary vein with two branches, one reaching the posterior angle of the appendicular field, the other reaching the free margin of the posterior field; appendicular field very large and elongate, length slightly less than length of proximal portion of wing, surface coriaceous, basal margin almost straight, lateral margins convex and convergent to the broadly rounded apex. Dorsal surface of male abdomen with sixth segment specialized mesad. Subgenital plate of male with styles situated mesad. Subgenital plate of female truncate distad, without median cleft, but sometimes with a small meso-distal emargination. Armament of limbs, character of tarsi, pulvilli and arolia as in *Chorisoneura*. Tarsal claws very distinctive from the known genera of the Blattidae; each claw very delicate, armed with two microscopic teeth mesad on its internal margin.

Plectoptera floridana new species (Plate X, figures 9 to 12.)

All of the material here considered, with the exception of the first specimen listed, has been recorded by Rehn and Hebard as *Plectoptera poeyi* (Saussure), a distinct but related Cuban species.[387]

The present insect is distinct from the other forms of the genus in the combination of size, head marking, general coloration and character of male subgenital plate.

Type.—♂; Key West, Florida. January 19, 1904. (M. Hebard.) [Hebard Collection Type no. 434.]

Description of Type.[388]—Size very small, medium for the genus. Head with width about equal to length; interocular space broad, but distinctly less than the very broad space between the antennal sockets, interocular space with a narrow, distinct, dark, transverse band. Pronotum and tegmina immaculate. Wings very delicate, broader than in *P. porcellana*,[389] with veins not conspicuously dark-

[387] A series of fifty-nine West Indian specimens of the genus, representing numerous species, is now before us and enables us to determine these facts.

[388] Many characters are given in the generic description which do not show even slight differences in the species of the present genus.

[389] Of which species, a series of Cuban specimens is before us.

ches of axillary vein without transverse connecting veinlets; appendic-
nple. Dorsal surface of abdomen with sixth segment showing meso-
very weakly defined, circular area, supplied with minute, microscopic,
ar d hairs, which lie flat and are directed caudad.[390] Supra-anal plate
produced, length nearly equal to one-half of width; lateral margins con-
d feebly concave to the blunt apex. Cerci simple, flattened; joints
ned,[391] distal joints tapering sharply to the acuminate apex. Subgenital
nall; free lateral margins concave-convergent to the median area, which is
subquadrate emarginate; the basal margin of this emargination (the meso-distal portion of the free margin of the plate) triangularly produced to an acute apex, with sides feebly convex, this production longer than broad; at the lateral bases of this produc are found the slender, flattened, cylindrical (but broadened proximad) styles h are laterally joined to the lateral portions of the plate, excepting distad, at their rounded apices, which are di ected caudo-laterad and are supplied with a few, minute, chitinous spines, these apices project slightly beyond the acute-angulate, sharply rounded apices of the lateral portions of the plate and well beyond the acute apex of the mesal production. The styles are of similar form and equal length. Armament of limbs and character of pulvilli, arolia and tarsal claws as given in generic description.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Very similar to male, differing in the following characters. Interocular space slightly broader, nearly equal to that between the antennal sockets. Dorsal surface of abdomen unspecialized. Supra-anal plate generally similar, but with apex distinctly emarginate, the projections thus formed broadly rounded; the plate with a medio-longitudinal sulcation feebly suggested. Subgenital plate large and broad, very feebly convex, the very large mesal section subdeplanate; lateral margins briefly and weakly convex, parallel, then rounding into the very broad, transverse distal portion, which laterad, at bases of cerci, is broadly and shallowly, but distinctly, concave, the intervening portion of the distal margin broad, nearly straight, very feebly convex; along this margin the plate curves slightly upward.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida, *type*		5.4	1.3	2.1	5.1	1.9
Key West, Florida, *paratypes*	(16)	5–5.7	1.3–1.6	2–2.2	4.4–4.8	1.8–1.9
♀						
Key West, Florida, *allotype*		5.5	1.3	2.3	5	1.9
Key West, Florida, *paratypes*	(11)	4.9–5.6	1.3–1.6	2.1–2.4	4.6–5.1	1.9–2

[390] This specialization can be seen only under a powerful lens.

[391] Usually about six in number.

The males of this species average very slightly smaller than the females, the more projecting subgenital plate, however, gives them an average equal body length.

Coloration.—General coloration ochraceous-buff with a tawny tinge. Head of general coloration, with a narrow, transverse line of prout's brown between the eyes, this line individually varies somewhat in intensity but is always conspicuous. Sometimes this line is margined with a paler coloration than the other portions of the head, ochraceous-buff to warm buff, these margins always weakly defined. Eyes prout's brown. Disk of pronotum varying from ochraceous-buff with a tawny tinge, to ochraceous-tawny; lateral portions of pronotum transparent, with a buffy tinge. Tegmina transparent ochraceous-buff. Wings transparent, in large part weakly iridescent and faintly tinged with ochraceous-tawny, this heavy in area of costal veins and narrowly along basal margin of appendicular field; appendicular field weakly tinged with ochraceous-tawny, with a suffusion of buckthorn brown along the anterior margin. Abdomen and underparts of male ochraceous-tawny. Ventral abdominal segments of female broadly margined laterad with buffy. Subgenital plate of female margined with buffy, broadly laterad, narrowly distad.

Four immature examples from Key West, Florida, beaten from *Ilex cassine*, are weak ochraceous-tawny in general coloration, with paler lateral markings on abdomen distinct in two, weakly defined in two. Two immature males, taken in the leaf mould of the key scrub at the same place, have the dorsal surface of the abdomen dark brown, marked with buffy laterad and meso-distad on the exposed segments, this becoming stronger latero-cephalad. The dark brown coloration is continued in meso-lateral, suffused bands on the metanotum, mesonotum and pronotum, these bands becoming weaker cephalad.

In the single female before us bearing an ootheca, only a sufficient portion is projecting to determine that this capsule is carried with suture dorsad; the suture bearing regularly placed, minute, but well projecting teeth, at wide intervals.

The known distribution of the species is defined by the material listed below.

Specimens Examined: 38; 17 males, 16 females and 5 immature individuals.

Big Pine Key, Fla., VII, 6, 1912, (Rehn and Hebard; beaten from fringe of tall bushes, on edge of mangrove swamp), 4 ♀, [Hebard Cln. and A. N. S. P.].

Key West, Fla., I, 19, 1904, (Hebard; fairly common, beaten from *Ilex cassine*), 5 ♂, 4 ♀, *type, allotype, paratypes;* III, 15, 1910, (Hebard; rare, beaten from *Ilex cassine*), 1 ♀, *paratype*, 1 juv. ♂; VII, 7, 1912, (Rehn and Hebard; fairly common, beaten from bushes, particularly *Ilex cassine*, 1 immature running about at night on leaves of *Conocarpus erecta*, two immature in leaf mould in key scrub), 12 ♂, 7 ♀, 1 with ootheca, *paratypes*, 2 juv. ♂, 2 juv. ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

Subfamily PANESTHINAE

The following features are considered diagnostic. Large robust insects with chitinous surface very heavy, the pronotal surface variously strongly irregular. Eyes not prominent; ocelli, when present in individuals with fully developed organs of flight, small, with convex surfaces. Tegmina fully developed, reduced to various degrees, or absent; when present, heavily chitinous, with anal sulcus alone conspicuous. Wings, when fully developed, exceptionally heavy in structure, with supplementary veins distad between the veins and their branches; mediastine vein extending to near apex of wing; costal veins subobsolete, their area very narrow; discoidal vein with numerous branches; ulnar vein with numerous complete and some incomplete proximal branches; intercalation obsolete.[392] Sixth ventral abdominal segment greatly enlarged in males, entirely hiding subgenital plate;[393] or with narrow distal portion of seventh segment exposed and chitinous, and succeeding segments obsolete.[394] Limbs very heavy and stout. Femora with ventral margins unarmed, except for a distal spine, or two spines; excepting ventro-cephalic margin of cephalic femora, which is armed, in some species, with one to four extremely heavy, elongate, proximal spines, succeeded distad by a series of elongate, chaetiform spines. Heavy pulvilli present on four proximal tarsal joints. Tarsal claws large and heavy, without arolia.

[392] In *Panesthia* and allies.

[393] This segment is called the seventh, by those authors who consider that the median segment represents the first dorsal abdominal segment.

[394] In *Cryptocercus*.

CRYPTOCERCUS Scudder

1862. *Cryptocercus* Scudder, Bost. Journ. Nat. Hist., vii, p. 419.

Two species of the present genus have been described.[395]

GENOTYPE, by monotypy: *C[ryptocercus] punctulatus* Scudder.

Description of Genus.—Eyes very decidedly reduced, small and convex, roundly trigonal, situated dorso-laterad of the antennal sockets and very little larger than these; no trace of ocellar spots. Pronotum convex, except for a wide and deep medio-longitudinal depression, which begins near the caudal margin and extends to a broad, concave, transverse area near the cephalic margin, which margin is broad and raised above the head in a brief hood; meso-laterad of the median depression, its sides are raised in weakly developed, roughened projections. Tegmina and wings absent. Limbs heavy. Sixth dorsal[396] and ventral abdominal segments produced, completely enveloping the genitalia. Cephalic femora with ventro-cephalic margin unarmed, except at distal extremity, where three,[397] short, stout, equal spines, directed nearly perpendicular to the margin, occur: the ventro-caudal margins of all the femora are (normally) armed each with two similar spines, otherwise all of the ventral femoral margins are smooth. The femora entirely lack dorsal genicular spines. Tarsi short and stout, first four joints each supplied distad with a large rounded pulvillus, these pulvilli extending half the distance to the base of each of the three short joints succeeding the metatarsus. Tarsal claws heavy, arolia absent.

Cryptocercus punctulatus Scudder (Plate X, figures 13 to 16.)

1862. *C[ryptocercus] punctulatus* Scudder, Bost. Journ. Nat. Hist., vii, p. 420.

[[nearly adult] ♂ Draper's Valley, Virginia; ♀ New York; ♀ Pennsylvania.]

We here select as type, the nearly adult male from Draper's Valley, Virginia.

[395] The second species is *Cryptocercus spadicus* Shiraki, described from Gifu, Japan, in 1906 (Annot. Zool. Jap., vi, p. 32, pl. ii, fig. 2). The description and figure afford no specific diagnostic characters. The measurements show the type to be either immature or a much smaller species than *punctulatus*.

[396] This segment is given as the seventh by Scudder, who considered the median segment to be the first dorsal abdominal segment.

[397] Rarely but two spines are found in this position, while in one example before us only a single spine is found there.

remarkable insect is distinctive among the species of North
rican roaches in the peculiar pronotum, which is thickened and
at hooded cephalad; in the absence of tegmina and wings,
in he production of the sixth dorsal and ventral abdominal
s, which completely conceal the genitalia in both sexes.

racters of Male.—(Sulphur Springs, North Carolina.) Head flattened; eyes projecting, ocelli absent; face polished, with minute, scattered, microscopic punctae. Maxillary palpi very short; fifth (distal) joint slightly longer than third or fourth, with distal truncation not strongly oblique, extending only one-third the distance from apex to base of joint. Pronotum polished, with punctae as on face, roughened along borders of median depression and with numerous minute, rounded projections in depressed area before the cephalic margin. Tegmina and wings absent. Mesonotum, metanotum and dorsal surface of abdomen polished, with minute, scattered, microscopic punctae, these more numerous laterad and on fifth segment, accompanied by a few, minute, rounded projections on fifth segment. Sixth dorsal abdominal segment triangularly produced; surface thickly supplied with minute depressions and minute, rounded, projections; lateral margins cingulate, convergent to the weakly emargin apex, this brief distal portion of the free margin not cingulate. Supra-anal subgenital plates and cerci situated within orifice formed by the produced sixth dorsal and ventral abdominal segments. Supra-anal plate not heavily chitinous, with free margins broadly concave laterad at bases of cerci, thence convex convergent, the median portion of the plate strongly produced, shield-shaped. Cerci stout, rather short, covered with minute hairs, tapering distad to acute apex, the lateral rgins entire, not crenate; dorsal surface flat, ventral surface convex, joints obsolete. Within the anal chamber, sinistrad, is situated a short, stout, genital hook, bent inward at a right-angle mesad and roughly rounded, with distal portion rather blunt. This genital hook springs from the surface of one of the soft lobes which are found within the anal chamber. Subgenital plate roughly scoop-shaped, produced, disto-laterad briefly and sharply emarginate on both sides, from which emarginations spring small, elongate, cylindrical, similar styles; between these the distal margin is rather strongly convex. Sixth ventral abdominal segment produced to meet the sixth dorsal abdominal segment; distal margin evenly convex; inner surface covered with a soft integument, which shows no medio-longitudinal suture. Limbs, armament of same, pulvilli and arolia as given in generic description.

Characters of Female.—(Sulphur Springs, North Carolina.) This sex is inseparable externally from the male; without removing the sixth ventral abdominal segment, it is sometimes impossible to determine the sex, but in frequent examples the internal surface of the sixth ventral abdominal segment is partially visible. Supra-anal plate concealed as in male, of similar form and structure. Subgenital plate absent. Sixth ventral abdominal segment as in male, except that the soft integument of the inner surface shows a weakly indicated, medio-longitudinal suture.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of caudal femur
Sulphur Springs, North Carolina....	(14)	24–29	7.2–8	9–9.8	5.7–6.2
Glendale, Oregon.....	(3)	24–28	7–7.9	9.1–9.8	5.8–6
♀					
Sulphur Springs, North Carolina...	(20)	23.5–27	7.2–7.9	9–9.9	5.7–6.1
Glendale, Oregon.....	(3)	24–28.5	7.1–7.7	9–9.8	5.7–6.2

Coloration.—General color shining, almost black, showing a paler tinge of claret brown on abdomen and ventral surface (intensive); deep claret brown, darker on pronotum and laterad on mesonotum and metanotum (recessive). Examples which have recently moulted are pale buffy in general coloration, until they begin to harden.

The following notes were made on the material here recorded from Oregon. "Two colonies were found in fir logs, only where the wood was soggy and the bark stripped easily. There, directly under the bark and in the burrowings in the sap wood, the series was taken. Individuals eat their way through the sap wood, preferring the places where it is soft, soggy and decayed." We have frequently observed this species and always under similar conditions, the decaying tree trunks belonging, however, to a variety of species.

The insect is distributed widely through the Appalachian region, from New York state to northern Georgia, and has been recorded westward as far as the Mammoth Cave, Kentucky. On the Pacific coast, it is known from Chehalis, Washington; Glendale, Divide and Cottage Grove, Oregon, and "California."

Specimens Examined: 205; 116 adults and 89 immature individuals.

New York, 1 juv., *paratype*, [M. C. Z.].

Pittsburg, Pennsylvania, 1 juv. ♀, [Pa. State Dept. Zool. Cln.].

Meadow Mountain, Garrett County, Maryland, VIII, 1911, (W. Stone), 3 adults, 2 juv., [A. N. S. P.].

Sounding Knob, Highland County, Virginia, 4400 feet, VIII, 21, 1916, (Hebard; summit forest, in decaying chestnut log), 2 ♂, 4 ♀, [Hebard Cln.].

Hot Springs, Va., 2400 to 2500 feet, VII, 3 to VII, 26, 1916, (Hebard; in decaying chestnut logs and in decaying sap wood of pine logs), 5 ♂, 5 ♀, 9 juv., [Hebard Cln.].

Collison Ridge, Bath County, Va., 3000 feet, VII, 14, 1916, (Hebard; decaying chestnut log in summit forest), 1 ♀, 1 juv., [Hebard Cln.].

Foot of Bald Knob, Bath County, Va., 3000 feet, VIII, 14, 1916, (Hebard; few immatures in decaying chestnut log), 1 juv., [Hebard Cln.].

Bald Knob, Bath County, Va., 3900 to 4000 feet, VIII, 19, 1906, (Hebard; decaying chestnut logs at upper limit of forest), 5 ♀, 4 juv., [Hebard Cln.].

Natural Bridge, Va., VIII, 4, 1915, (P. P. Calvert), 1 ♂, [A. N. S. P.].

Draper's Valley, Va., 1 nearly adult ♂, *type*, [M. C. Z.].

Mountain Lake, Giles County, Va., VII, 28, 1915, (P. P. Calvert), 1 adult, [A. N. S. P.].

Stone Mountain, Va., (Pollock), 1 adult, [U. S. N. M.].

Cumberland Mountains, Lee County, Va., VIII, 1879, (H. G. Hubbard), 1 adult, [M. C. Z.].

Blowing Rock, North Carolina, (Willcox), 1 ♀, [A. N. S. P.]; VII, 19, 1903, (A. P. Morse), 5 adults, 1 juv., [Morse Cln.]; VIII, 13, (G. P. Englehardt), 6 adults, [Bklyn. Inst.].

Linville, N. C., VII, 18, 1903, (A. P. Morse), 1 adult, 10 juv., [Morse Cln.].

Pisgah Forest, N. C., VIII, 12, 1908, 2 adults, 1 juv., [U. S. N. M.].

Sulphur Springs, N. C., 2500 feet, V, 25 to VI, 13, 1904, (Hebard; in decaying chestnut logs), 45 adults, 35 juv., [Hebard Cln. and A. N. S. P.].

Old Bald Mountain, N. C., V, 14, 1904, (Hebard), 3 adults, 1 juv., [Hebard Cln.].

Balsam, N. C., VII, 23, 1903, (A. P. Morse), 1 adult, [Morse Cln.].

Black Rock Mountain, Georgia, 3000 feet, V, 20 to 25, 1911, 1 juv. ♂, [Hebard Cln.].

Wilson Gap, Mountain City, Ga., VIII, 22, 1913, (J. C. Bradley), 6 adults, 2 juv. [Ga. State and Hebard Clns. and A. N. S. P.].

Clayton, Ga., 2000 to 3700 feet, VI, 1909, (W. T. Davis), 4 adults, 2 juv., [Davis Cln. and A. N. S. P.]; VIII, 18, 1 ♂, [Ga. State Cln.].

Rome, Georgia, 700 to 1500 feet, VIII, 31, 1 ♀, [A. N. S. P.].

Delashmut Creek, West Virginia, VII, 21, 1900, 1 adult, [U. S. N. M.].

Coalburg, West Va., 1874, (Edwards), 1 adult, [M. C. Z.].

Hinton, West Va., (W. P. Hay), 1 adult, [U. S. N. M.].

South Robling, Kentucky, VII, 19, (H. Garman), 1 juv., [M. C. Z.].

Near Mammoth Cave, Ky., X, 2, (Putnam), 1 juv., [M. C. Z.].

Between Osceola and Greensburg, Ky., VII, 17, (H. Garman), 2 small juv., [M. C. Z.].

Corbin, Ky., VIII, 24, 1 juv., [U. S. N. M.].

Cumberland Gap, Tennessee, (G. Dimmock), 1 adult, [M. C. Z.].

Chehalis, Washington, VII, 1896, 1 ♂, [Hebard Cln.].

Glendale, Oregon, VII, 12, 1909, (Rehn and Hebard; in decaying fir logs), 3 ♂, 3 ♀, 9 juv. ♂ in last instar, 1 juv. ♀ in last instar, 1 small juv. ♂, [Hebard Cln. and A. N. S. P.].

SUPPLEMENT. ADVENTIVE MATERIAL

In the following pages are listed the Blattidae which, in various ways, have been found to be adventive, but not established, in portions of the United States and Canada. These represent thirty-one species, of which eight are also native in southern portions of the United States. One hundred and forty-one specimens have been examined.

It is clear that almost any exotic species may be carried alive by commerce to this country, this being facile in the case of forms which are domiciliary to various degrees. It is equally evident that, unless particularly adapted to the environmental and climatic conditions encountered, hardly any possibility exists of their becoming permanently established. Thus, species from Europe and other regions of temperate climate might easily become firmly established. Species from the tropics, however, could not survive in the United States, except possibly in the very limited tropical areas on the southern border of this country, or elsewhere under precarious artificial conditions.

The enormous number of species which might be brought to this country, without any likelihood of becoming established, is illustrated by the observations made by the author on the fruit steamer "Tenadores." After leaving New York with hold empty, eight species of tropical Blattidae were secured; of these four only have been found adventive in United States. Of these four, two are also apparently native in the southernmost regions of the United States; none have been introduced and become established. To treat fully each species which is recorded as adventive, but not established, would in consequence be of little real value. The systematic analysis would require a comparative discussion and treatment of allied species which have no bearing whatever on the species native in the United States.

In the preparation of the present paper, we have made no effort to discuss the adventive species, but careful comparisons have been made with all of the related exotic species available, and the literature has been studied for all of these, in order to insure as nearly correct determinations as possible.

main portion of the present work the following ten species, we feel satisfied are established adventives in this country, as treated.

	Probable origin	Distribution in United States
Blattella germanica	Europe	General
Supella supellectilium	Circumtropical	Tropical Florida
Symploce lita	American tropics	Tropical Florida
Leurolestes pallidus	Circumtropical	Tropical Florida
Blatta orientalis	Asia	General
Periplaneta australasiae	Asia	Southeastern United States
Periplaneta brunnea	American tropics	Southeastern United States
Neostylopyga rhombifolia	Circumtropical	Southern Arizona
Blaberus craniifer	North American tropics	Tropical Florida
Holocompsa nitidula	American tropics	Tropical Florida

It is of interest to note that these species are all domiciliary, or at least they prefer to live under the changed conditions brought about by the proximity of human habitations.

Six of these species have become established only in the extremely limited tropical areas on the southern border of the United States.

The adventives of frequent occurrence, but not established in all, or in all but the southernmost portions, of the United States, are seven in number; of these *Periplaneta australasiae* is established in the southeastern United States, *Pycnoscelus surinamensis* appears to be a species native in the southern portions of that area, while *Panchlora cubensis* is native in the tropical Brownsville region of Texas.

Nyctibora noctivaga
Nyctibora laevigata
Epilampra maya
Periplaneta australasiae
Pycnoscelus surinamensis
Panchlora cubensis
Blaberus discoidalis

The remaining species are known to be rarely adventive;—of these there is a possibility that *Ischnoptera rufa occidentalis* has become established on the Gulf Coast; while *Parcoblatta lata*, *Eurycotis floridana*, *Periplaneta americana* and *brunnea* and *Holocompsa nitidula*, are rarely introduced in the portions of the country where they are neither native or established.

It may be noted that the importation of tropical fruit is easily the chief means of introduction of exotic Blattidae.

We have been fortunate in having additional material for comparison, from places where the species are native, of all the species here considered, excepting *Platyzosteria bifida* and *Hormetica advena*.

PSEUDOMOPINAE

Latiblattella species

A female of a species of this genus, related to *L. pavida* (Rehn), is before us.

As the steamship Tenadores had on previous trips loaded bananas only at Bocas del Toro, Panama, and Limon, Costa Rica, the material found on that ship and recorded in the present paper was almost certainly taken on at one of the two places.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, [Hebard; alive in hold), 1 ♀, [Hebard Cln.].

Cariblatta insularis (Walker)

1868. *Blatta insularis* Walker, Cat. Blatt. Br. Mus., p. 101. [♀, Jamaica.]

This very small insect, with head strikingly marked, delicate picturing of the pronotum and two proximal darker dashes on each of the elongate tegmina, is known to be native in Porto Rico, Jamaica and Antigua.

Washington, District of Columbia, IV, 19, 1910, (H. S. Barber; at light[398]), 1 ♂,[399] [U. S. N. M.].

Neoblattella fratercula Hebard

1916. *Neoblattella fratercula* Hebard, Ent. News, xxvii, p. 159. [♂, ♀; Isla de Cocos, Costa Rica, and material listed below.]

The present species is the smallest known of the North American species of *Neoblattella*. It shows some affinity to *N. brunneriana*,

[398] The specimen is without question adventive, having probably escaped from fruit in nearby stands.

[399] The subgenital plate of this specimen is evidently distorted and does not agree with a large topotypic Jamaican series before us, which have the subgenital plate symmetrical with sinistral specialized style distinctive. See Hebard, Trans. Am. Ent. Soc. xlii, p. 175 and p. 160, footnote 16, (1916). In the present specimen the median production of the subgenital plate is distorted; the sinistral style irregularly formed, showing three spines. In all other respects the specimen is normal and these features are in our opinion best referable to decided individual abnormality.

and also may be said to show the nearest approach, in the present genus, to the South American complex of the genus *Cariblatta*.[400]

Lincoln, Nebraska, VII, 15, (in bananas, probably from Central America), 1 ♂, [Hebard Cln.].

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 2 ♀, [Hebard Cln.].

Neoblattella detersa (Walker)

1868. *Blatta detersa* Walker, Cat. Blatt. Br. Mus., p. 215. [♀, Jamaica.]

This plain and medium-sized species shows a remarkable and distinctive specialization of the male subgenital plate. Material from Hayti and Jamaica is before us. In the latter island the insect is abundant.

Green Bay, Wisconsin, VI, 1, 1915, (N. F. Howard), 1 ♂, [Hebard Cln.].

Neoblattella nahua (Saussure and Zehntner)

1893. *Blatta nahua* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 42, pl. iv, figs. 19 to 21. [♂, ♀: Mexico; Atoyac, Vera Cruz, Mexico; Tabasco, Mexico.]

This large species is closely allied to the genotype, *N. adspersicollis* (Stål), from which species it is readily separable by excellent male genitalic and other characters. The superficial resemblance of the two species is remarkable.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♀, [Hebard Cln.].

Neoblattella fraterna (Saussure and Zehntner)

1893. *Blatta fraterna* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 44. [♂, Chontales, Nicaragua.]

This very broad, medium-sized species is nearest in relationship to *N. nahua*, of the known species of the genus, but shows very great differences, not only in size and form, but also in the genitalia of both sexes.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♂, [Hebard Cln.].

[400] See Hebard, Trans. Am. Ent. Soc., xlii, p. 152, (1916).

Ischnoptera rufa occidentalis Saussure.[401]

1862. *I[schnoptera] occidentalis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 170. [♀; [New [Orleans, Louisiana].]

The specimen listed below and the type of this common reddish insect, furnish the only records of the species from north of Vera Cruz, Mexico. Extensive study and field work along the Gulf Coast in the United States, leads us to be strongly of the opinion that these two northern records are based on adventive, rather than indigenous, material.

Gulf coast of Texas, (Aaron), 1 ♀, [M. C. Z.].

Parcoblatta lata (Brunner)

1865. *I[schnoptera] lata* Brunner, Nouv. Syst. Blatt., p. 135. (Exclusive of synonymy.) [♂, North America?]

This species, widely distributed throughout the southeastern United States, is fully discussed on page 126.

Wellesley, Massachusetts, VII, 3, 1916, (A. P. Morse; in house), 1 ♀, [Morse Cln.].

Xestoblatta festae (Griffini)

1896. *E[pilampra] festae* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 2. [[♀]; Punta de Sabana, Darien.]

This relatively robust, shining reddish-brown insect, belonging to a genus of the group Ischnopterites, has recently been fully discussed.[402]

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♀, [Hebard Cln.].

NYCTIBORINAE

Nyctibora noctivaga Rehn

1902. *Nyctibora noctivaga* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♀; Machuca, Nicaragua.]

This great brown roach, one of the largest species of the genus, is found to be native in Central America and Jamaica.[403] The

[401] See Hebard, Trans. Am. Ent. Soc., xlii, p. 352, pl. xvi, fig. 7, (1916).

[402] See Hebard, Trans. Am. Ent. Soc., xlii, p. 377, pl. xix, figs. 8 to 11, (1916).

[403] The only other species of like size, is the apparently very closely related Brazilian *N. brunnea* of Thunberg, of which *N. holosericea* Burmeister is a synonym, according to Shelford. Serville's *N. tomentosa*, of which *N. latipennis* of Burmeister is probably a synonym, as has been admitted by its author (Zeitschr. Ent., Germar, ii, p. 24, (1840)), is even larger, with antennae showing a pale annulus.

ero[illegible]s adventive records of *N. holosericea*, probably, and the [illegible]ds of *N. mexicana*,[404] from the United States and Canada, ap[illegible] this species.

In the present genus the immature females differ from adults of that sex in having the subgenital plate strongly triangularly produced dextrad, with apex rounded; in the early stages the seventh ventral abdominal segment is not concealed, the styles remaining visible.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; found dead), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Toronto, Ontario, (E. M. Walker; in bananas), 1 juv. ♂, [Univ. Toronto Cln.].

Framingham, Massachusetts, V, 25, 1915, (in store), 1 juv. ♂, [Morse Cln.].

Wellesley, Mass., I, 15, 1904, (in bananas), 1 ♂, [Morse Cln.].

Hyde Park, Mass., X, 1, 1903, (M. E. Cherrington; in house), 1 juv. ♀, [Morse Cln.].

Dalton, Mass., I, 2, 1899, (E. A. Halle), 1 juv. ♂, [U. S. N. M.].

Lynchburg, Virginia, VIII, 22, 1891, (W. A. Strother; in bananas), 1 ♀, [U. S. N. M.].

Ohio, 1 juv. ♂, [U. S. N. M.].

Chicago, Illinois, (Burton; in bananas), 1 juv. ♀, [U. S. N. M.].

Iowa City, Iowa, (C. F. Wickham), 1 juv. ♂, [Hebard Cln.].

Lyons, Nebraska, (in fruit), 1 juv. ♂, [illegible]ard Cln.].

Wahoo, Nebr., IX, 12, 1903, (in bananas), 1 ♂, [Hebard Cln.].

Lincoln, Nebr., (in bananas), 1 juv. ♂; II, 1 juv. ♀; V, 28, 1890, (B. Shimek; in grocery store), 1 ♀, [all Hebard Cln.].

Fairbury, Nebr., VIII, 1893, (in bananas), 1 ♀, 1 juv. ♂, [Hebard Cln.].

Oak, Nebr., IV, 1903, (P. C. Mercer; in bananas), 1 juv. ♂, [Hebard Cln.].

Longmont, Colorado, (fruit case in grocery store), 1 juv. ♂, [U. S. N. M.].

Texas, (unquestionably adventive), 1 ♀, [Univ. Kansas Cln.].

Medicine Hat, Alberta, III, 6, 1903, 1 juv. ♀, [Univ. Toronto Cln.].

Idaho Falls, Idaho, (in bananas), 1 juv. ♀, [U. S. N. M.].

Los Angeles, California, V, 23, 1903, 1 juv. ♀, [U. S. N. M.].

Claremont, Cal., (E. O. Essig; unquestionably adventive), 1 ♂, [State Insectary, Cal.].

Nyctibora laevigata (Beauvois)[405]

1805. *Blatta laevigata* Beauvois, Ins. Rec. Afr. et Amér., p. 228, Orth. pl. II, fig. 4. [San Domingo.]

This distinctive, smaller, ovate and brilliantly colored species, native in Hayti and Jamaica, is represented by the adventive

[404] Based on the specimens recorded below from Texas and Colorado.

[405] For the full history and discussion of this species see Rehn and Hebard, Ent. News, xxv, pp. 121–123, (1914).

material listed below. The species has been thrice recorded as *N. sericea*[406] from the United States.

Toronto, Ontario, (C. W. Nash; in bananas), 1 ♂, [Univ. Toronto Cln.].
Orono, Maine, V, 16, 1889, (in bunch of bananas), 1 ♀, [Maine Agr. Exp. Sta. Cln.].
Manchester, New Hampshire, 1 ♀, [Morse Cln.].
Massachusetts, 1 ♀, [U. S. N. M.].
Boston, Mass., II, 20, 1887, (F. H. Sprague), 1 ♂,[407] [M. C. Z.].
Wellesley, Mass., 1899, (on bananas), 1 juv. ♀,[408] [Morse Cln.].
Natick, Mass., summer of 1902, (in fruit store), 1 ♂, 1 ♀, [Morse Cln.].
Springfield, Mass., VIII, 17, 1898, (C. Ladd), 1 ♀,[409] [M. C. Z.].
Manahawkin, New Jersey, IX, 1, 1913, (F. Haimbach), 1 ♀, [A. N. S. P.].
Philadelphia, Pennsylvania, (P. Laurent; Delaware wharf), 1 ♂,[410] [Hebard Cln.].
Germantown, Pa., (H. C. Thompson; in bananas), 1 ♀, [Thompson Cln.].
Harrisburg, Pa., 1 ♂, [Pa. State Dept. Zool.].
Lock Haven, Pa., V, 30, (in bananas), 1 ♀, [Pa. State Dept. Zool.].

EPILAMPRINAE

Epilampra maya Rehn

1902. *Epilampra maya* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♀;[411] Machuca, Nicaragua.]

The present species is medium-small for the genus, rather stout, rather pale and little marked, with elongate tegmina having two or more small dark brown spots on distal half. It is native in Central America; large South America series before us show several closely related but distinct species.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; found dead), 1 ♂, 1 ♀, [Hebard Cln.].
Woodstock, Vermont, VIII, 1911, 1 ♀, [Morse Cln.].
Framingham, Massachusetts, IV, 10, 1914, (C. A. Frost; in bananas in grocery store), 1 ♀, [Morse Cln.].
Boonton, New Jersey, 1 ♀, [A. N. S. P.].

[406] Shelford has synonymized *sericea* of Burmeister, under *limbata* of Thunberg. This is a similarly marked South American species, with tegmina and wings, however, proportionately much longer and more of the type generally found in the genus, than in *laevigata*.

[407] Twice recorded in 1900 by Scudder as *sericea*.

[408] Recorded by Morse in 1900 as *Eurycotis* sp., "possibly *E. finschiana* (Sauss.)."

[409] Recorded in 1900 by Henshaw as *sericea*.

[410] Recorded by Rehn as *sericea* in 1902.

[411] This specimen was unfortunately given as a representative of the male sex in the original description.

BLATTINAE

Platyzosteria bifida (Saussure)

1872. *P[olyzosteria] bifida* Saussure, Mélang. Orth., ii, p. 110. [♂; Queensland, Australia.].

This insect suggests a flattened, unicolorous, dark Periplanetid; closer examination, however, shows the very different features of the genus, while the species is distinctive in the genitalia and the extraordinarily specialized maxillary palpus of the male.

That an individual of the Australasian group to which this insect belongs should be brought to America, shows how very widely roaches may be distributed by commerce.[412]

Fairbury, Nebraska, VIII, 1893, (in bananas), 1 ♂, [Hebard Cln.].

Eurycotis[413] **caraibea** (Bolivar)

1888. *P[olyzosteria] caraibea* Bolivar, Mém. Soc. Zool. Fr., i, p. 126. [♂, Cuba.]

This medium-small, pale, Cuban species is distinctive in having, with the black interocular band and two black disto-dorsal abdominal segments and supra-anal plate, the tegmina quadrate but not attingent.

Ithaca, New York, VII, 9, 1895, (in bunch of bananas), 1 ♂, [Hebard Cln.].
Berwick, Pennsylvania, VIII, 25, 1908, 1 ♂,[414] [Pa. State Dept. Zool.].

Eurycotis tibialis Hebard

1916. *Eurycotis tibialis* Hebard, Ent. News, xxvii, p. 261, pl. xiv, fig. 2, text fig. [♂, ♀; San Francisco Mountains, San Domingo; adventive at Orono, Maine.]

This blackish species, having subtriangular lateral tegmina, is known only from the material originally discussed.

Orono, Maine, 1 ♀, [Morse Cln.].

[412] Shelford has recorded a specimen, evidently an adventive also, from Brazil. Trans. Ent. Soc. London, 1909, p. 274, (1909).

[413] The questioned record of an immature example as *Eurycotis finschiana* (Saussure), adventive in the United States, is here definitely referred to *Nyctibora laevigata* (Beauv.).

[414] This specimen differs from the description of the species and the other individual before us, in having the tegmina decidedly reduced in width and consequently more lateral, with intervening space decidedly greater than the width of a tegmen. In other respects the specimen is so fully typical, that this difference seems best attributable to individual variation.

Eurycotis floridana (Walker)

1868. *Periplaneta floridana* Walker, Cat. Blatt. Br. Mus., p. 135, [♀: St. John's Bluff, east Florida; North America.]

This species, which is native and apparently confined in distribution to the Sabalian and Tropical Floridian Zones of the southeastern United States, is fully discussed on page 166. The present adventive example was probably shipped north in packing boxes or other freight.

Beaver, Pennsylvania, VII, 18, 1 ♀, [Pa. State Dept. Zool.].

Eurycotis opaca (Brunner)

1865. *P[olyzosteria] opaca* Brunner, Nouv. Syst. Blatt., p. 216. [♂, Cuba.].

This Cuban species is closely related to *E. floridana*. It is distinguished by its larger size, generally rougher surface, decidedly broader head and normal darker coloration.

Orono, Maine, VI, 18, 1909, 1 ♀, [Maine Agr. Exp. Sta. Cln.].

Rochester Mill, Pennsylvania, VII, 28, 1908, 1 juv. ♂, in instar preceding maturity, [Pa. State Dept. Zool.].

Pelmatosilpha rotundata Scudder

1900. *Pelmatosilpha rotundata* Scudder, Proc. Davenport Acad. Nat. Sci., viii, p. 93, pl. 2, fig. 5. [♂, Texas; ♀, Panama.]

We have examined the figured male type from Texas, which we here designate as lectotype. There is no doubt that this specimen was accidentally introduced, almost certainly from Central America. In the unstudied series before us, the species is represented in material from that region, but is not found in any of the Mexican series.

The insect is a dark, glossy, medium-sized roach, with broadly rounded tegmina extending to the apex of the abdomen and showing no veins on their polished dorsal surfaces.

Periplaneta americana (Linnaeus)

1758. [*Blatta*] *americana* Linnaeus, Syst. Nat., Ed. X, p. 424. [America.]

This species is fully discussed on page 178.

Pequaming, Michigan, VI, 30, 1903, (Hebard; in store), 1 juv., [Hebard Cln.].

Milwaukee, Wisconsin, IX, 10, 1912, (A. C. Burrill), 1 ♂, [Wisc. Agr. Exp. Sta. Cln.].

ta brunnea Burmeister

riplaneta] *brunnea* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 503. Chile; Demerara [British Guiana].]

I ve discussed this species on page 182.

, North Carolina, VIII, 1897, 1 ♀, [Hebard Cln.].

ieta australasiae (Fabricius)

[*Blatta*] *australasiae* Fabricius, Syst. Ent., p. 271. ["In nave e mare Pacifico et i ic ibus incognitis revertente."]

pecies is fully discussed on page 185; it is constantly being t uced north of the regions in which it has become established, but is evidently much more decidedly affected by cold than *P. americana*, and in consequence has never become permanently established in the United States north of the areas in which the winter climate is comparatively mild. In the colder regions of the United States, whe t has appeared in greenhouses and such artificially heated places, t has been found to breed and increase in numbers with great rapidity, temporarily becoming a dangerous pest, so that vigorous efforts have been found necessary to exterminate such a colony.[415]

North of Pennsylvania, occasional adventive specimens of the species are constantly being reported; such records are found from Montreal, Quebec; Toronto, Ontario; Wellesley, Massachusetts; Wallingford and New Haven, Connecticut, and from Minnesota.

The following adventive material is now before us.

Rutherford, New Jersey, XI. 19, 1915, (H. B. Weiss; in greenhouse), 2 ♂, [A. N. S. P.].

Philadelphia, Pennsylvania, VI, 30, 1898, 1 ♂, [A. N. S. P.].

Radnor, Pa., I, 14, 1905, (J. Hurley; swarming in greenhouses and adjacent homes), 3 ♂, 1 ♀, 1 juv. ♂, 2 juv. ♀, [A. N. S. P. and Hebard Cln.].

PANCHLORINAE

Leucophaea maderae (Fabricius)

1781. *B*[*latta*] *maderae* Fabricius, Spec. Ins., I, p. 341. [Madeira.]

This large insect is tawny olive in general coloration, inconspicuously marked with dark brown. It is domiciliary and very

[415] See Skinner, Ent. News, xvi, p. 183, (1905), on the appearance of the insect in great numbers on an estate at Radnor, Pennsylvania.

widely distributed through the West Indies. An adventive specimen has been recorded from St. Johns, New Brunswick.

New York, New York, (on bananas), 1 ♂, [Bklyn. Inst.].

Pycnoscelus surinamensis (Linnaeus)

1767. [*Blatta*] *surinamensis* Linnaeus, Syst. Nat., Ed. XII, p. 687. [Surinam.]

This species is discussed on page 193; the adventive material before us is listed below.

Cromwell, Connecticut, III, 1, 1911, (B. H. Walden; from greenhouse), 2 ♀, [Hebard Cln.].

New York, New York, XI, 1913, (W. Beutenmüller; reptile house of N. Y. Zool. Soc.), 6 ♀, 1 juv. ♀, [A. N. S. P.].

Rutherford, New Jersey, XI, 19, 1915, (H. B. Weiss), 4 ♀, 2 juv. ♀, [A. N. S. P.].

Washington, District of Columbia, II, 1888, 1 ♀, 4 juv. ♀, [Hebard Cln.].

The species readily establishes itself in earth or debris and dust indoors, far north of its normal range,[416] provided the temperature is kept high during the cold months.

The specimens from New York and Rutherford are all very dark, the pale cephalic marking on the pronotum being obsolete mesad and only very narrowly indicated laterad at the cephalic angles.

Panchlora cubensis Saussure

1862. *P[anchlora] cubensis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 230. [♀, Cuba.]

This insect is discussed on page 198; though it has never become established outside the tropics, living examples are constantly being shipped into the United States, far north of the species' normal distribution, the great majority of these coming in tropical fruits. The adventive material before us is listed below.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♀, [Hebard Cln.].

Orono, Maine, 1892, (in tropical fruit), 1 ♀, [Maine Agr. Exp. Sta. Cln.].

Augusta, Me., 1906, 1 ♀, [U. S. N. M.].

Boston, Massachusetts, XII, 26, 1878, (S. Kneeland; flying in store), 1 ♀, [M. C. Z.].

Stoneham, Mass., XI, 15, 1915, (C. V. Blackburn), 1 ♀, [Morse Cln.].

[416] An immature specimen, taken from a bunch of bananas, has been recorded from Toronto, Ontario.

Melrose, Mass., VI, 17, 1914, (F. W. Dodge), 1 ♀, [Morse Cln.].

Wellesley, Mass., XII, 12, 1894, (Miss Hubbard; on window of Stone Hall), 1 ♀, [Morse Cln.].

Framingham, Mass., VIII, 1, 1914, (C. A. Frost; in grocery store), 1 ♀, [Morse Cln.].

Salem, Mass., VIII, 1, 1890, (E. S. Morse; in bathroom of house), 1 ♀, [M. C. Z.].

Albany, New York, III, 25, 1908, 1 ♀, [U. S. N. M.].

Brooklyn, N. Y., (on bananas), 1 ♀, [Bklyn. Inst.]; IX, 8, 1891, (C. L. Gissler), 1 ♀, [U. S. N. M.].

Staten Island, N. Y., III, 1906, 1 ♀; XII, 1910, 1 ♀, [both Davis Cln.].

New Brighton, Staten Island, N. Y., III, 1915, VIII, 9, 1912, (W. T. Davis; from bananas), 2 ♀, [Davis Cln.].

Newark, New Jersey, IX, 26, 1913, (F. Lange; on bananas), 1 ♀, [U. S. N. M.].

Philadelphia, Pennsylvania, III, 9, 1914, (E. R. Casey; alive in street), 1 ♀, [Casey Cln.]; 1 ♀, [A. N. S. P.].

Washington, District of Columbia, 1 ♀; XI, 19, 1915, (F. Knab), 1 ♀, [both U. S. N. M.].

Arlington, Virginia, VIII, 1913, (H. A. Allard; Experiment Farms), 1 ♀, [Hebard Cln.].

Madison, Wisconsin, IV, 8 to fall, 1915 and 1916, 3 ♀, [Wisc. Agr. Exp. Sta. Cln.].

Lincoln, Nebraska, I, 30, 1904, (L. Gooding; in bananas), 1 ♀; (Miss Fossler), 1 ♀; 1 ♀, [all Hebard Cln.].

Osceola, Nebr., (R. Heald), 1 ♀, [Hebard Cln.].

Douglas County, Kansas, (R. H. Beamer), 1 ♀, [Univ. Kansas Cln.].

Fort Collins, Colorado, (in bunch of bananas), 1 ♀, [Morse Cln.].

Stockton, Utah, III, 1915, (from bunch of bananas), 1 ♀, [Davis Cln.].

Bremerton, Washington, 1914, (F. G. Dunn), 1 ♀, [U. S. N. M.].

The nomenclatural confusion in the plain green species of the present genus is well shown by the past records for this series. The specimen from Boston has been recorded by Scudder as *viridis;* that from Salem by the same author as *nivea*, then as *viridis;* that from Albany as *hyalina* of Saussure by Felt, determined by Caudell; one of the Brooklyn examples by Riley as *viridis*, and one from Philadelphia by Rehn as *virescens*. These have further been the bases for subsequent records by Scudder of *poeyi* from "seaboard cities," by Bruner as *viridis* and *exoleta* indefinitely in the New Jersey list, while the species has been further recorded as *viridis* from Wellesley, Massachusetts, by Morse and from Pittsburg, Pennsylvania, by Riley. In the discussion of the

species by Felt, the Boston, Salem and Brooklyn records are all placed under *hyalina* of Saussure.

In considering these various names, we can state that *viridis* and *nivea* are names referable to a South American complex, no individuals of which have appeared in collections of material adventive in the United States. Shelford has, after examination of the types, placed *virescens* in the synonymy under *nivea*, while *exoleta* is a normally larger insect, of which species the first specimen adventive in the United States, and hitherto unrecorded, is now before us. Saussure's *poeyi*, from the original description, appears to be an absolute synonym of his *cubensis*, based on the opposite (♂) sex, from Cuba. Saussure's *hyalina* (renamed *translucida* by Kirby) does not belong to the plain green species, being one of the forms in which the antennae bear a black annulus; *Blatta hyalina* of Stoll is a different insect, so poorly described and figured that it can merely be located as one of the plain green forms of the present genus, and in consequence, with type destroyed and no locality given, we believe that name best treated as unidentifiable.

Scudder has recorded the species as *viridis*, taken on a steamer en route from Jamaica to the United States, in order to show the usual means of introduction of the species. Wholly contrary to the opinion expressed by Felt, we do not believe the present insect can establish itself in temperate climates except under artificial conditions. It is essentially an out-of-doors dweller in the tropics and can not adapt itself to artificial surroundings, as the domiciliary forms do so readily.

Panchlora exoleta Burmeister

1838. *P[anchlora] exoleta* Burmeister, Handb. Ent., ii, abth. ii, pt. 1, p. 507. [Pará and Bahia, Brazil.]

This species is closely related to *P. cubensis*. Females may solely be distinguished by their average decidedly larger size and more opaque margins of the pronotum and marginal fields of the tegmina.[417]

[417] These characters are found in a series of the species before us.

Massachusetts, VI, 7, 1884, (Mrs. H. King; probably in bananas), 1 ♀,[418] Museum].

a zendala Saussure

anchlora] *zendala* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 231. [[♀; Guatemala.]

is a large greenish species with immaculate antennae, but ack lateral lines on pronotum and tegmina.

n, Wisconsin. V, 24, 1916, (L. S. Cole), 1 ♀, [Hebard Cln.].

BLAB NAE

Blaberus colosseus (Illiger)[419]

1802. *Blatta colossea* Illiger, Mag. Insektenkunde, i, p. 186. [Demerara, [= British Guiana].]

This insect, with the even la er *B. gigantea*, represents the maximum size development fou l in the genus and is of the palest general coloration.

This species has been recorded from New Orleans, Louisiana, by Saussure as the synonymous *B. mexicana*.

Blaberus discoidalis[420] Serville

1839. *Blabera discoidalis* Serville, Hist. Nat. Ins., Orth., p. 76. [♀, San Domingo.]

The species is moderately small for the genus, with tegmina and wings extending little beyond the apex of the abdomen, this particularly striking in the female sex; the general coloration is of the normal moderately pale brown found in numerous species of the genus.

The New Jersey adventives before us are decidedly large for the species. The female from Secaucus has the dark pronotal marking exceptionally extensive, covering all but the rather narrow cephalic and lateral margins.

This species appears to gain occasionally a temporary footing in greenhouses in the United States, being introduced in tropical plants.

[418] The measurements of this specimen are: length of body, 20; length of pronotum, 7.1; width of pronotum (crushed), 9.2; length of tegmen, 25.6; width of tegmen, 7.8 mm.

[419] For the synonymy under this species see Hebard, Ent. News, xxvii, p. 291, (1916).

[420] For the synonymy under this species see Hebard, Ent. News, xxvii, p. 294, (1916).

New York, New York, (M. L. Small), 1 ♂, [U. S. N. M.].

Rutherford, New Jersey, VI, 12, 1916, (H. B. Weiss; in greenhouse), 1 ♂, 1 ♀, [Hebard Cln.].

Secaucus, N. J., VI, 1, 1916, (H. B. Weiss; in greenhouse), 1 ♀, 1 juv. ♀, [A. N. S. P.]; X, 17, 1916, (H. B. Weiss; in case of orchids from Colombia), 2 ♀, [Weiss and Hebard Clns.].

CORYDIINAE

Holocompsa nitidula (Fabricius)

1781. *B[latta] nitidula* Fabricius, Spec. Ins., i, p. 345. [[♀, from description], Surinam.]

This species is fully discussed on page 206.

Washington, District of Columbia, (D. Clemens; on cotton batting in store room of National Museum), 1 ♀, [U. S. N. M.].

OXYHALOINAE

Plectoptera picta Saussure and Zehntner

1893. *Plectoptera picta* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 85, pl. iii, fig. 9. [♀; Atoyac, Vera Cruz, Mexico.]

This beautiful insect is distinctively colored. The character of the labels leaves some doubt as to whether the material listed below is really adventive, the specimens clearly representing odds and ends which had been marked with little care.

Virginia, 1 ♀, [U. S. N. M.].

Texas, 1 ♂, [U. S. N. M.].

PERISPHAERINAE

Hormetica advena Scudder

1900. *Hormetica advena* Scudder, Proc. Davenport Acad. Nat. Sci., viii, p. 94. [♀; Belmont, Massachusetts.]

This striking insect is known from the unique type.

Belmont, Massachusetts, XII, (G. H. Parker; "unquestionably introduced from tropical America"), 1 ♀, *type*, [M. C. Z.].

Explanation of Plates

Plate I

Fig. 1.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Dorsal view. (×3)

Fig. 2.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Dorsal outline of supra-anal plate. (×12)

Fig. 3.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Caudal view of subgenital plate. (×12)

Fig. 4.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Dorsal view of concealed genitalic process. (Greatly enlarged.)

Fig. 5.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Caudal view of concealed genitalic process. (Greatly enlarged.)

Fig. 6.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 7.—*Euthlastoblatta abortiva* (Caudell). Esperanza Ranch, near Brownsville, Texas. Female. *Type*. Dorsal View. (×3)

Fig. 8.—*Euthlastoblatta abortiva* (Caudell). Esperanza Ranch, near Brownsville, Texas. Female. *Type*. Dorsal view of supra-anal plate. (×6)

Fig. 9.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Paratype*. Dorsal view. (×3)

Fig. 10.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Paratype*. Ventral view of subgenital plate. (About ×12)

Fig. 11.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Paratype*. Caudal view of subgenital plate. (About ×12)

Fig. 12.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Type*. Cephalic outline of cephalic femur. (Much enlarged.)

Fig. 13.—*Latiblattella rehni* new species. Miami, Florida. Male. *Type*. Dorsal view. (×3)

Fig. 14.—*Latiblattella rehni* new species. Miami, Florida. Male. *Type*. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 15.—*Latiblattella rehni* new species. Miami, Florida. Male. *Type*. Dorsal view of distal abdominal segments, showing specialization. (Much enlarged.)

Fig. 16.—*Latiblattella rehni* new species. Lakeland, Florida. Male. Chitinous thorn of concealed genitalia. (Greatly enlarged.)

Fig. 17.—*Latiblattella rehni* new species. Miami, Florida. Female. *Allotype*. Dorsal view. (×3)

Fig. 18.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Dorsal view. (×3)

Fig. 19.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 20.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Dorsal view of distal abdominal segments, showing specialization. (Much enlarged.)

Fig. 21.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Chitinous thorn of concealed genitalia. (Greatly enlarged.)

Fig. 22.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Caudal view of subgenital plate. (Much enlarged.)

Fig. 23.—*Latiblattella lucifrons* new species. Huachuca Mountains, Arizona. Female. Dorsal view. (×3)

Fig. 24.—*Supella supellectilium* (Serville). Key West, Florida. Male. Dorsal view of pronotum. (×3)

Fig. 25.—*Supella supellectilium* (Serville). Key West, Florida. Male. Dorsal view of tegmen. (×3)

Fig. 26.—*Supella supellectilium* (Serville). Key West, Florida. Male. Dorsal view of abdomen. (×3)

Fig. 27.—*Supella supellectilium* (Serville). Key West, Florida. Male. Projecting chitinous plate of concealed genitalia. (Greatly enlarged.)

Plate II

Fig. 1.—*Cariblatta lutea lutea* (Saussure and Zehntner). Ormond, Florida, Male. Dorsal view. (×4½)

Fig. 2.—*Cariblatta lutea lutea* (Saussure and Zehntner). Spring Creek, Georgia. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 3.—*Cariblatta lutea minima* Hebard. Miami, Florida. Male. *Type*. Dorsal view. (×4½)

Fig. 4.—*Cariblatta lutea minima* Hebard. Miami, Florida. Male. *Type*. Cephalic outline of cephalic femur.[1] (Much enlarged.)

Fig. 5.—*Cariblatta lutea minima* Hebard. Miami, Florida. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 6.—*Blattella germanica* (Linnaeus). St. Louis, Missouri. Male. Dorsal view of tegmen. (×3)

Fig. 7.—*Blattella germanica* (Linnaeus). Miami, Florida. Male. Dorsal view of abdomen. (×3)

Fig. 8.—*Blattella germanica* (Linnaeus). Miami, Florida. Male. Dorsal view of pronotum. (×3)

Fig. 9.—*Blattella germanica* (Linnaeus). St. Louis, Missouri. Male. Dextral chitinous process of concealed genitalia. (Greatly enlarged.)

Fig. 10.—*Ischnoptera deropeltiformis* (Brunner). Plummer's Island, Maryland. Male. Dorsal outline. (×2)

Fig. 11.—*Ischnoptera deropeltiformis* (Brunner). Plummer's Island, Maryland. Male. Cephalic outline of cephalic femur.[2] (Much enlarged.)

[1] Characteristic of the genus *Cariblatta*.

[2] Characteristic of the genus *Ischnoptera*.

schnoptera deropeltiformis (Brunner). Mountain Grove, Missouri. Male. Lateral outline of one of two processes of sixth dorsal abdominal segment. (Greatly enlarged.)

schnoptera deropeltiformis (Brunner). Plummer's Island, Maryland. Male. Dorsal outline of supra-anal plate. (Much enlarged.)

Fig. 14.—*schnoptera deropeltiformis* (Brunner). Plummer's Island, Maryland. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 15.—*Ischnoptera deropeltiformis* (Brunner). Washington, District of Columbia. Female. Dorsal outline. (×2)

Fig. 16.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Dorsal outline. (×3)

Fig. 17.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Cephalic [illegible] of head. (Much enlarged.)

Fig. 18.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Cephalic outline of cephalic femur.[3] (Much enlarged.)

Fig. 19.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Dorsal view of supra-anal plate. (Much enlarged.)

Fig. 20.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Plate III

Fig. 1.—*Parcoblatta bolliana* (Saussure and Zehntner). Sulphur Springs, North Carolina. Male. Dorsal view. (×3)

Fig. 2.—*Parcoblatta bolliana* (Saussure and Zehntner). Sulphur Springs, North Carolina. Male. Ventral view of subgenital plate.[4] (×5½)

Fig. 3.—*Parcoblatta bolliana* (Saussure and Zehntner). Raleigh, North Carolina. Female. Dorsal view. (×3)

Fig. 4.—*Parcoblatta desertae* (Rehn and Hebard). Sabinal, Texas. Male. Dorsal view. (×3)

Fig. 5.—*Parcoblatta desertae* (Rehn and Hebard). Sabinal, Texas. Male. Ventral view of subgenital plate. (×5½)

Fig. 6.—*Parcoblatta desertae* (Rehn and Hebard). Fort Davis, Texas. Female. Dorsal view. (×3)

Fig. 7.—*Parcoblatta americana* (Scudder). Sonoma County, California. Male. Dorsal view. (×3)

Fig. 8.—*Parcoblatta americana* (Scudder). Sonoma County, California. Male. Ventral view of subgenital plate. (×5½)

Fig. 9.—*Parcoblatta americana* (Scudder). Mount Shasta, California. Female. Dorsal view. (×3)

[3] Characteristic of the genus *Symploce*.

[4] In the genus *Parcoblatta*, the styles of the male subgenital plate are little dissimilar. These styles are movable and are drawn as they happen to lie in the various specimens here figured.

Fig. 10.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Dorsal view. (×3)

Fig. 11.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 12.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Dorsal view of supra-anal plate. (×5½)

Fig. 13.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Ventral view of subgenital plate. (×5½)

Fig. 14.—*Parcoblatta zebra* new species. Havana, Illinois. Female. *Allotype*. Dorsal view. (×3)

Fig. 15.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Dorsal view. (×3)

Fig. 16.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 17.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 18.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Ventral view of subgenital plate. (×5½)

Fig. 19.—*Parcoblatta notha* (Rehn and Hebard). Palmerlee, Arizona. Female. *Allotype*. Dorsal view. (×3)

Plate IV

Fig. 1.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Dorsal view. (×3)

Fig. 2.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 3.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 4.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Fig. 5.—*Parcoblatta virginica* (Brunner). Upsal, Philadelphia, Pennsylvania. Female. Dorsal view. (×3)

Fig. 6.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Dorsal view. (×3)

Fig. 7.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 8.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Dorsal outline of dextral cercus. (Much enlarged.)

Fig. 9.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Fig. 10.—*Parcoblatta uhleriana* (Saussure). Whitemarsh, Pennsylvania. Female. Dorsal view. (×3)

Fig. 11.—*Parcoblatta uhleriana* (Saussure). Whitemarsh, Pennsylvania. Ootheca. Dorsal view of a portion of the sutural margin. (About ×7)

Fig. 12.—*Parcoblatta uhleriana* (Saussure). Whitemarsh, Pennsylvania. Ootheca. Cross-section showing remarkable specialization of sutural margin. (Much enlarged.)

Fig. 13.—*Parcoblatta fulvescens* (Saussure and Zehntner). Thomasville, Georgia. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 14.—*Parcoblatta fulvescens* (Saussure and Zehntner). Thomasville, Georgia. Male. Dorsal outline of sinistral cercus. (Much enlarged.)

Fig. 15.—*Parcoblatta fulvescens* (Saussure and Zehntner). Spring Creek, Georgia. Female. Dorsal view. (×3)

Fig. 16.—*Parcoblatta fulvescens* (Saussure and Zehntner). Brownsville, Texas. Female. Dorsal view showing more rotundate tegmina. (×3)

Plate V

Fig. 1.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Dorsal view. (×3)

Fig. 2.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 3.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Dorsal view of supra-anal plate. (×5½)

Fig. 4.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Ventral view of subgenital plate. (×5½)

Fig. 5.—*Parcoblatta caudelli* new species. Spartanburg, South Carolina. Female. *Allotype*. Dorsal view. (×3)

Fig. 6.—*Parcoblatta lata* (Brunner). Natchez, Mississippi. Male. Dorsal view of pronotum. Exceptional intensive coloration. (×3)

Fig. 7.—*Parcoblatta lata* (Brunner). Thomasville, Georgia. Male. Dorsal view of pronotum. (×3)

Fig. 8.—*Parcoblatta lata* (Brunner). Thomasville, Georgia. Male. Dorsal view of median and first dorsal abdominal segments. (×5½)

Fig. 9.—*Parcoblatta lata* (Brunner). Thomasville, Georgia. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 10.—*Parcoblatta lata* (Brunner). Thomasville, Georgia. Male. Ventral view of subgenital plate. (×5½)

Fig. 11.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Dorsal view of median and first abdominal segments. (×5½)

Fig. 12.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Lateral view of median and first dorsal abdominal segments. (×5½)

Fig. 13.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 14.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Fig. 15.—*Parcoblatta divisa* (Saussure and Zehntner). Opelika, Alabama. Female. Dorsal view. Organs of flight exceptionally developed. (×3)

Fig. 16.—*Parcoblatta divisa* (Saussure and Zehntner). Augusta, Georgia. Female. Dorsal view. (×3)

Fig. 17.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 18.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Lateral view of median and first dorsal abdominal segment. (×5½)

Fig. 19.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 20.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Plate VI

Fig. 1.—*Parcoblatta lata* (Brunner). Raleigh, North Carolina. Female. Dorsal view. (×6)

Fig. 2.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Cephalic outline of cephalic femur.[5] (Much enlarged.)

Fig. 3.—*Parcoblatta pensylvanica* (DeGeer). Mount Airy, Philadelphia, Pennsylvania. Female. Dorsal view. (×6)

Fig. 4.—*Parcoblatta pensylvanica* (DeGeer). Iowa City, Iowa. Dorsal view of tegmen.[6] (×6)

Fig. 5.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Type*. Dorsal view. (×3)

Fig. 6.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Type*. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 7.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Paratype*. Concealed genital hook. (Greatly enlarged.)

Fig. 8.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Type*. Caudal outline of subgenital plate, showing the highly specialized styles. (Much enlarged.)

Fig. 9.—*Eurolestes pallidus* (Brunner). Key West, Florida. Male. Dorsal view. (×3)

Fig. 10.—*Eurolestes pallidus* (Brunner). Key West, Florida. Male. Cephalic outline of cephalic femur. (Much enlarged.)

Fig. 11.—*Eurycotis floridana* (Walker). Ojus, Florida. Male. Dorsal view. (×3)

Fig. 12.—*Eurycotis floridana* (Walker). Ojus, Florida. Male. Ventral view of subgenital plate. (×7)

[5] Characteristic for the genus *Parcoblatta*.

[6] Showing the maximum reduction in females of this species before us.

Eurycotis floridana (Walker). Cedar Keys, Florida. Female. Dorsal view of supra-anal plate. (×7)

Fig. 14.—*Eurycotis floridana* (Walker). Cedar Keys, Florida. Female. Ventral view of subgenital plate. (×7)

Fig. 15.—*Neostylopyga rhombifolia* (Stoll). Nogales, Arizona. Female. Dorsal view. (×3)

Plate VII

Fig. 1.—*Blatta orientalis* Linnaeus. Chestnut Hill, Philadelphia, Pennsylvania. Male. Dorsal view. (×2)

Fig. 2.—*Blatta orientalis* Linnaeus. Marathon, Texas. Female. Dorsal view. (×2)

Fig. 3.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Dorsal view of pronotum, normal coloration. (×2)

Fig. 4.—*Periplaneta americana* (Linnaeus). Florence, Arizona. Male. Dorsal view of pronotum, maximum [illegible]nsive coloration.[7] (×2)

Fig. 5.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Outline of sinistral tegmen and wing. (Natural size.)

Fig. 6.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)

Fig. 7.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)

Fig. 8.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Concealed dextral genital process. (Greatly enlarged.)

Fig. 9.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Ventral view of subgenital plate. (×3)

Fig. 10.—*Periplaneta americana* (Linnaeus). Key West, Florida. Female. Dorsal view of supra-anal plate and cerci. (×2)

Fig. 11.—*Periplaneta americana* (Linnaeus). Philadelphia, Pennsylvania. Female. Ventral view of subgenital plate. (×2)

Fig. 12.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Dorsal view of pronotum. (×2)

Fig. 13.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)

Fig. 14.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)

Fig. 15.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Ventral view of subgenital plate. (×3)

Fig. 16.—*Periplaneta brunnea* Burmeister. Fort Myers, Florida. Female. Dorsal view of supra-anal plate and cerci. (×2)

Fig. 17.—*Periplaneta australasiae* (Fabricius). Homestead, Florida. Male. Dorsal view of pronotum. (×2)

[7] A close approach to this coloration is frequently found in ***Periplaneta brunnea***.

Fig. 18.—*Periplaneta australasiae* (Fabricius). Homestead, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)

Fig. 19.—*Periplaneta australasiae* (Fabricius). Homestead, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)

Fig. 20.—*Periplaneta fuliginosa* (Serville). Crowley, Louisiana. Male. Dorsal view of pronotum. (×2)

Fig. 21.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)

Fig. 22.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Ventral view of supra-anal plate. (×6)

Fig. 23.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Ventral view of subgenital plate. (×3)

Fig. 24.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)

Plate VIII

Fig. 1.—*Pycnoscelus surinamensis* (Linnaeus). St. Augustine, Florida. Female. Dorsal view. (×2)

Fig. 2.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Male. Dorsal view. (×3)

Fig. 3.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Male. Cephalic view of head. (×9)

Fig. 4.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Male. Ventral view of subgenital plate and cerci. (Much enlarged.)

Fig. 5.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Female. Cephalic view of head. (×9)

Fig. 6.—*Blaberus craniifer* Burmeister. Key West, Florida. Male. Dorsal view. (Natural size.)

Fig. 7.—*Blaberus craniifer* Burmeister. Key West, Florida. Male. Ventral view of subgenital plate. (×3)

Fig. 8.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Male. Dorsal view. (×3)

Fig. 9.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 10.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Female. Dorsal view. (×3)

Fig. 11.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Female. Ventral view of subgenital plate. (Much enlarged.)

Plate IX

The concealed genital plates and hooks are given as seen from below, the subgenital plate having been removed. From this aspect the dextral plates naturally appear sinistral, and the sinistral hooks, dextral.

Fig. 1.—*Homoeogamia mexicana* Burmeister. Jalapa, Vera Cruz, Mexico. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 2.—*Homoeogamia mexicana* Burmeister. Jalapa, Vera Cruz, Mexico. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 3.—*Arenivaga bolliana* (Saussure). Brownsville, Texas. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 4.—*Arenivaga bolliana* (Saussure). Brownsville, Texas. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 5.—*Arenivaga bolliana* (Saussure). Carrizo Springs, Texas. Female. Dorsal view. (×2)

Fig. 6.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type.* Dorsal view. (×2)

Fig. 7.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type.* Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 8.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type.* Concealed dextral genital plates. (Greatly enlarged.)

Fig. 9.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type.* Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 10.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Female. *Allotype.* Dorsal view. (×2)

Fig. 11.—*Arenivaga erratica* Rehn. Hackberry Creek, Brewster County, Texas. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 12.—*Arenivaga erratica* Rehn. Hackberry Creek, Brewster County, Texas. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 13.—*Arenivaga erratica* Rehn. Georgetown, Texas. Female. Dorsal view. (×2)

Fig. 14.—*Arenivaga apacha* (Saussure). Phoenix, Arizona. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 15.—*Arenivaga apacha* (Saussure). Phoenix, Arizona. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 16.—*Arenivaga apacha* (Saussure). Death Valley, California. Female. Dorsal view. (×2)

Fig. 17.—*Eremoblatta subdiaphana* (Scudder). Sentinel, Arizona. Male. Lateral outline of maxillary palpus.[8] (Much enlarged.)

[8] Characteristic of the genus *Eremoblatta*.

Fig. 18.—*Eremoblatta subdiaphana* (Scudder). Sentinel, Arizona. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 19.—*Eremoblatta subdiaphana* (Scudder). Sentinel, Arizona. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 20.—*Eremoblatta subdiaphana* (Scudder). Mesilla Park, New Mexico. Female. Dorsal view. (×2)

Fig. 21.—*Eremoblatta hirsuta* new species. Sierra el Tosti, Lower California, Mexico. Male. *Type*. Dorsal view. (×2)

Fig. 22.—*Eremoblatta hirsuta* new species. San José del Cabo, Lower California, Mexico. Female. *Allotype*. Dorsal view. (×2)

Plate X

Fig. 1.—*Compsodes schwarzi* (Caudell). Esperanza Ranch near Brownsville, Texas. Male. Dorsal view. (×3)

Fig. 2.—*Compsodes schwarzi* (Caudell). Brownsville, Texas. Male. Dorsal view of supra-anal plate. (Greatly enlarged.)

Fig. 3.—*Compsodes schwarzi* (Caudell). Brownsville, Texas. Male. Caudal view of subgenital plate showing concealed genitalia. (Greatly enlarged.)

Fig. 4.—*Compsodes schwarzi* (Caudell). Brownsville, Texas. Male. Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 5.—*Attaphila fungicola* Wheeler. Austin, Texas. Male. Dorsal outline. (×3)

Fig. 6.—*Attaphila fungicola* Wheeler. Austin, Texas. Male. Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 7.—*Chorisoneura texensis* Saussure and Zehntner. Brownsville, Texas. Male. Dorsal outline. (×3)

Fig. 8.—*Chorisoneura texensis* Saussure and Zehntner. Brownsville, Texas. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 9.—*Plectoptera floridana* new species. Key West, Florida. Female. *Allotype*. Dorsal outline.[9] (×3)

Fig. 10.—*Plectoptera floridana* new species. Key West, Florida. Male. *Paratype*. Cephalic view of occiput, showing characteristic marking. (Greatly enlarged.)

Fig. 11.—*Plectoptera floridana* new species. Key West, Florida. Male. *Type*. Dorsal view of wing. (×3)

Fig. 12.—*Plectoptera floridana* new species. Key West, Florida. Male. *Type*. Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 13.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Female. Dorsal view. (×1½)

[9] In this species the tegminal veins are scarcely visible when the tegmina are folded.

Fig. 14.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Male. Subgenital plate. (×8)

Fig. 15.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Male. Supra-anal plate and cerci. (×8)

Fig. 16.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Female. Ventral view of concealed oviposition valves.[10] (Greatly enlarged.)

[10] These are found in the anal orifice, below the supra-anal plate. The subgenital plate has entirely disappeared in females of the present species.

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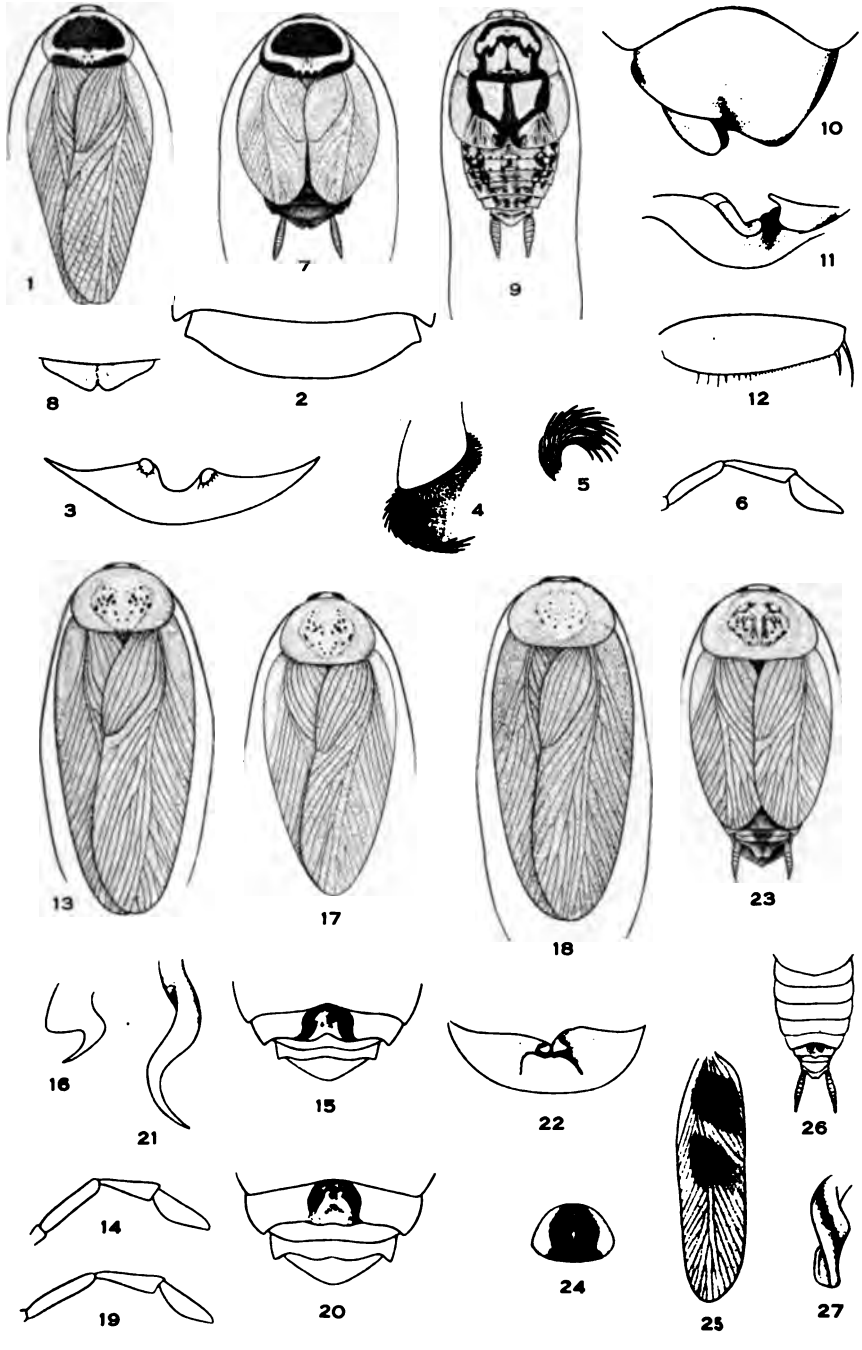

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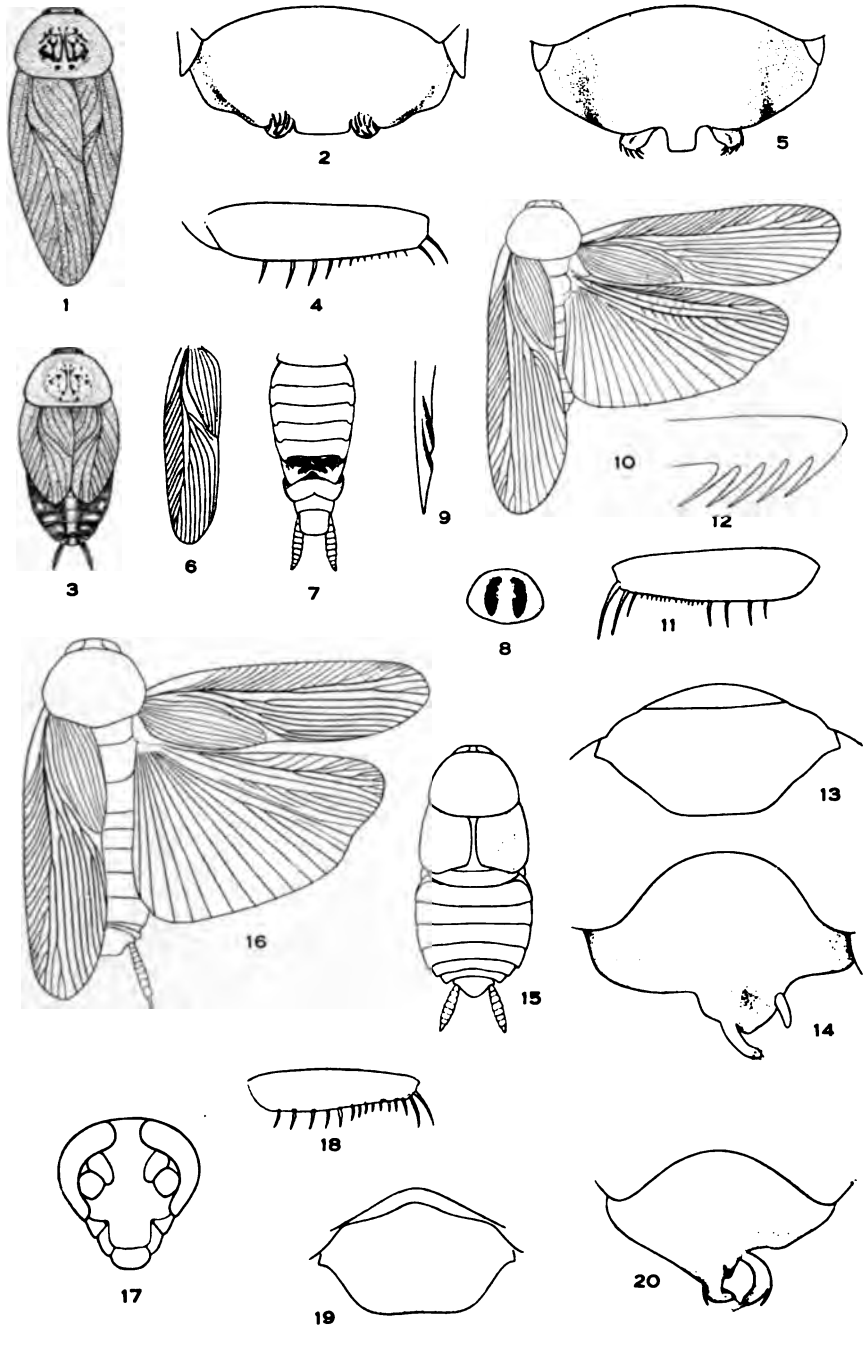

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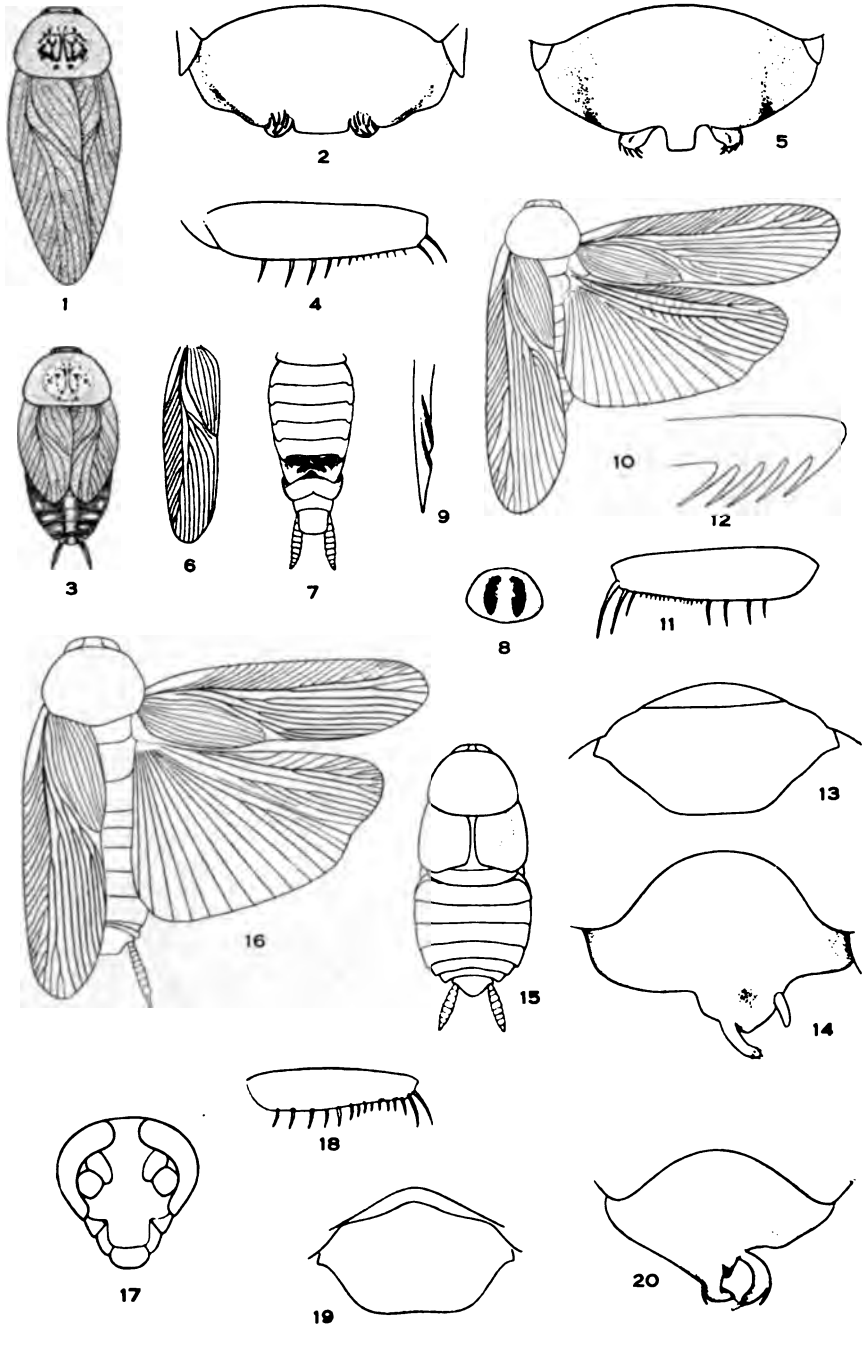

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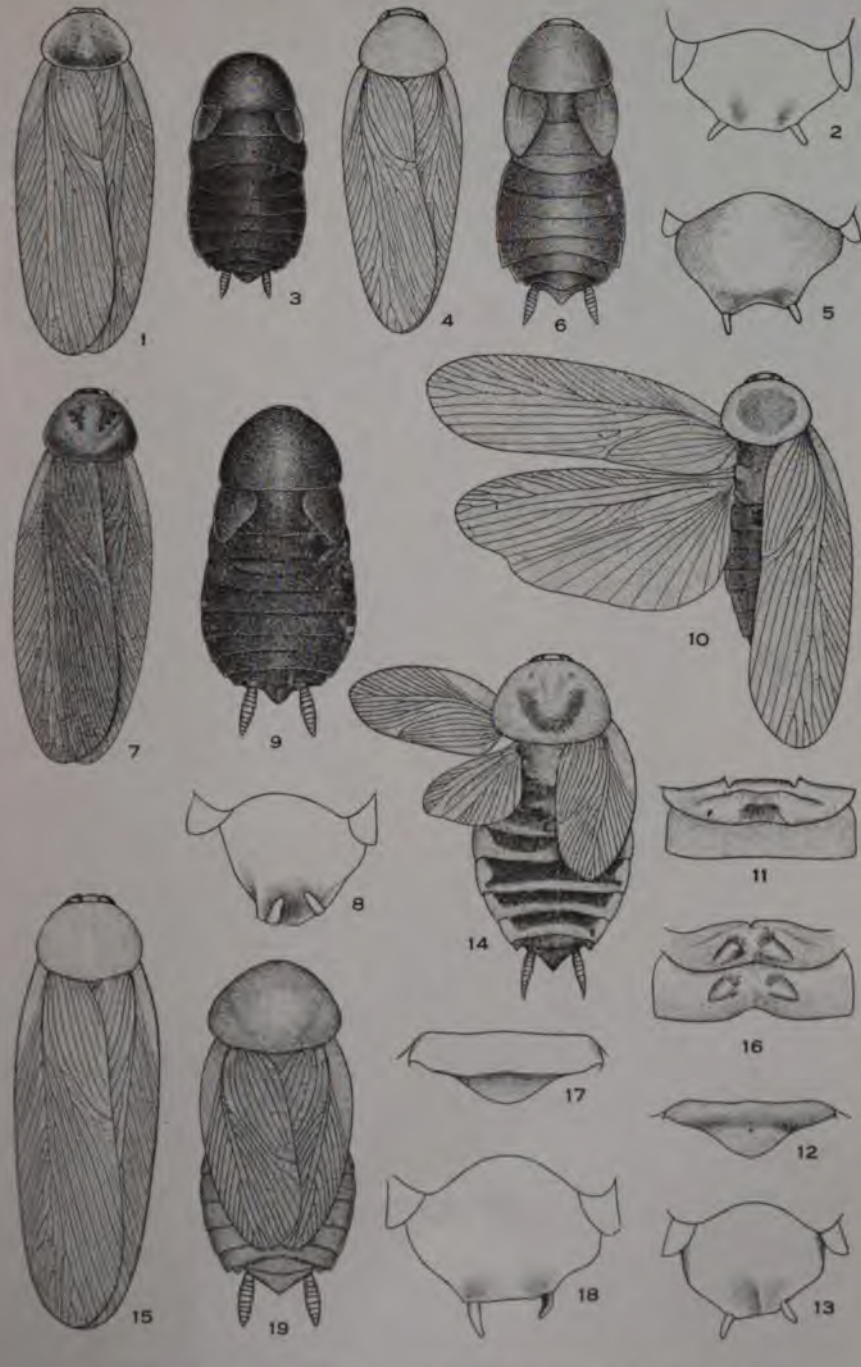

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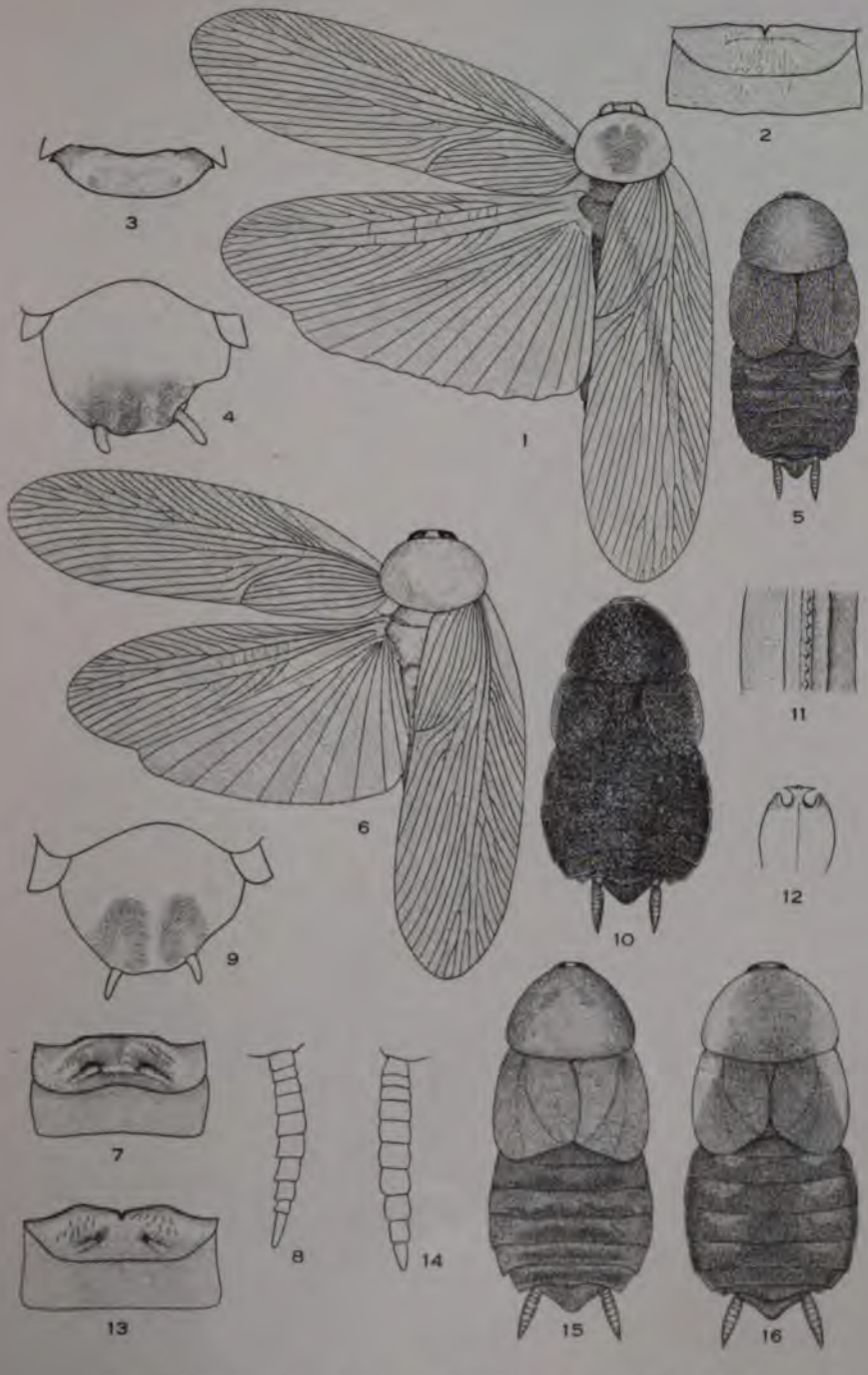

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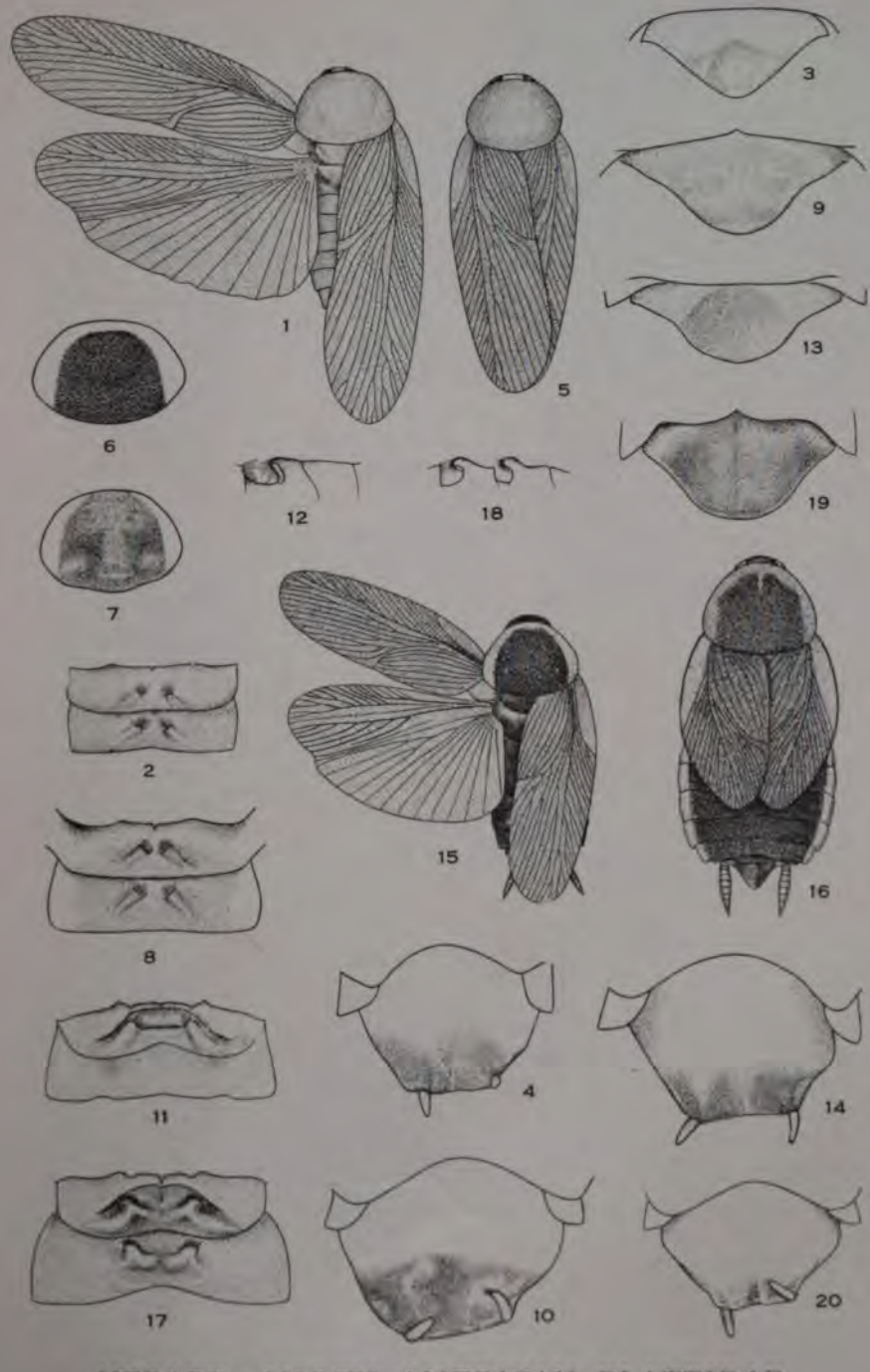

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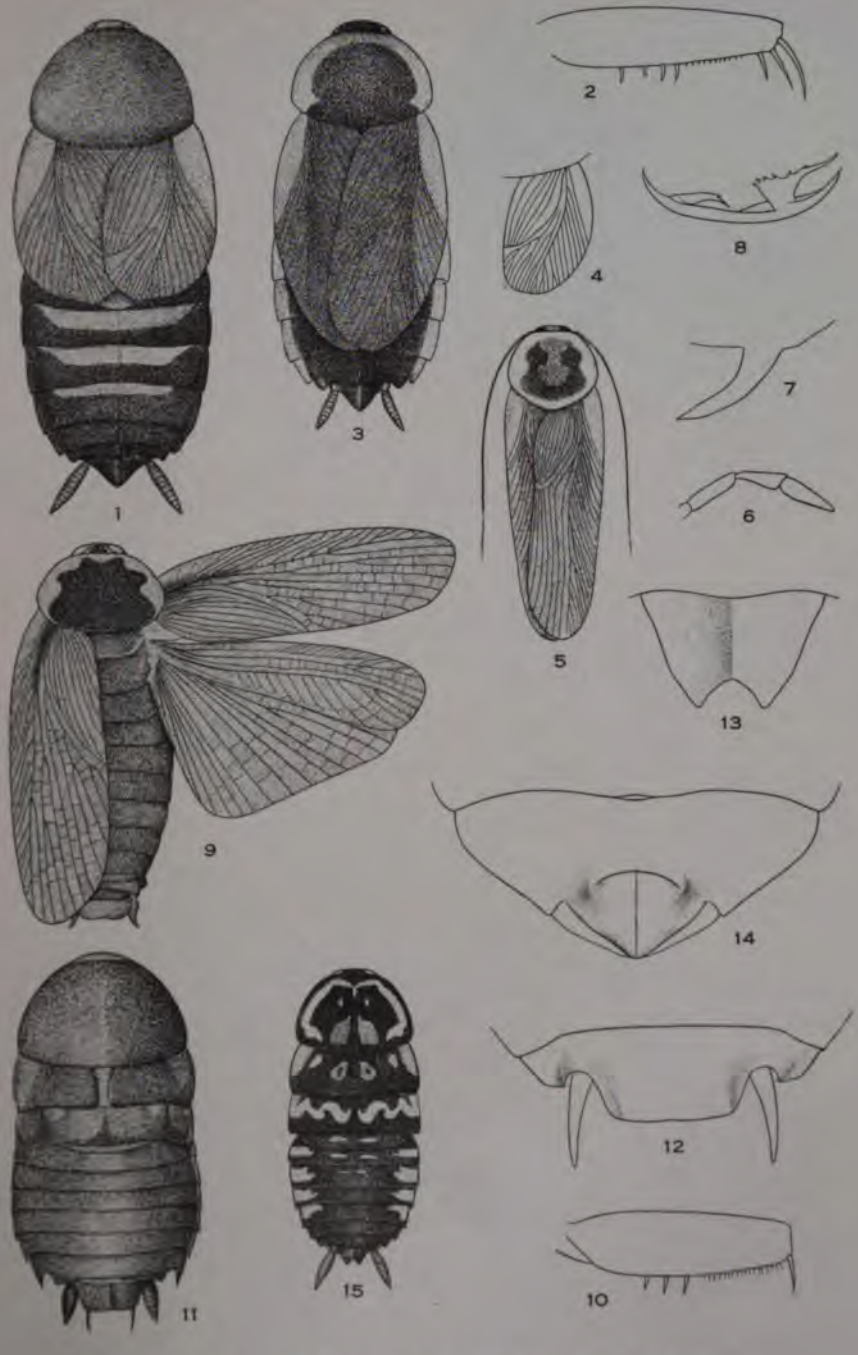

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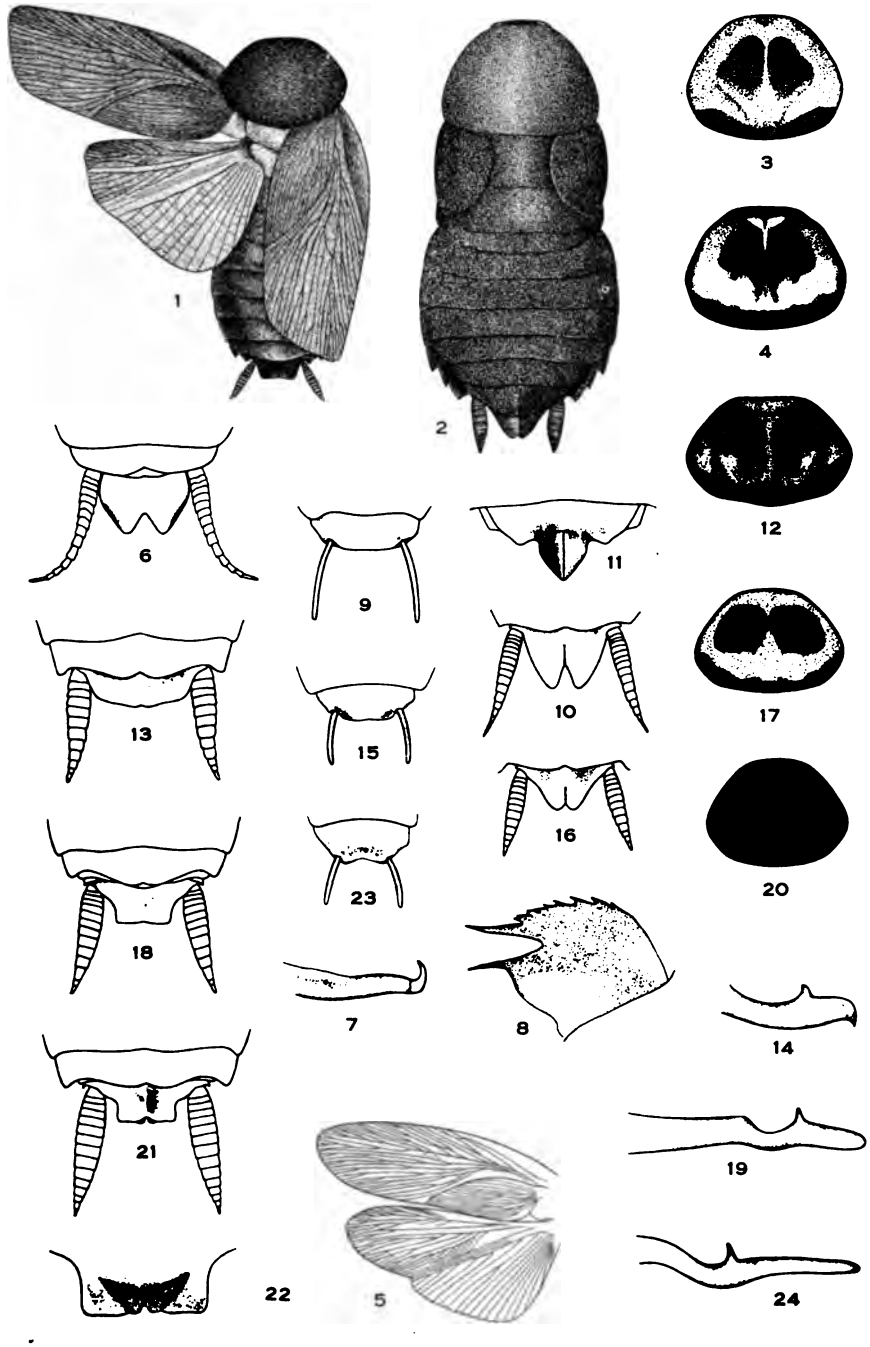

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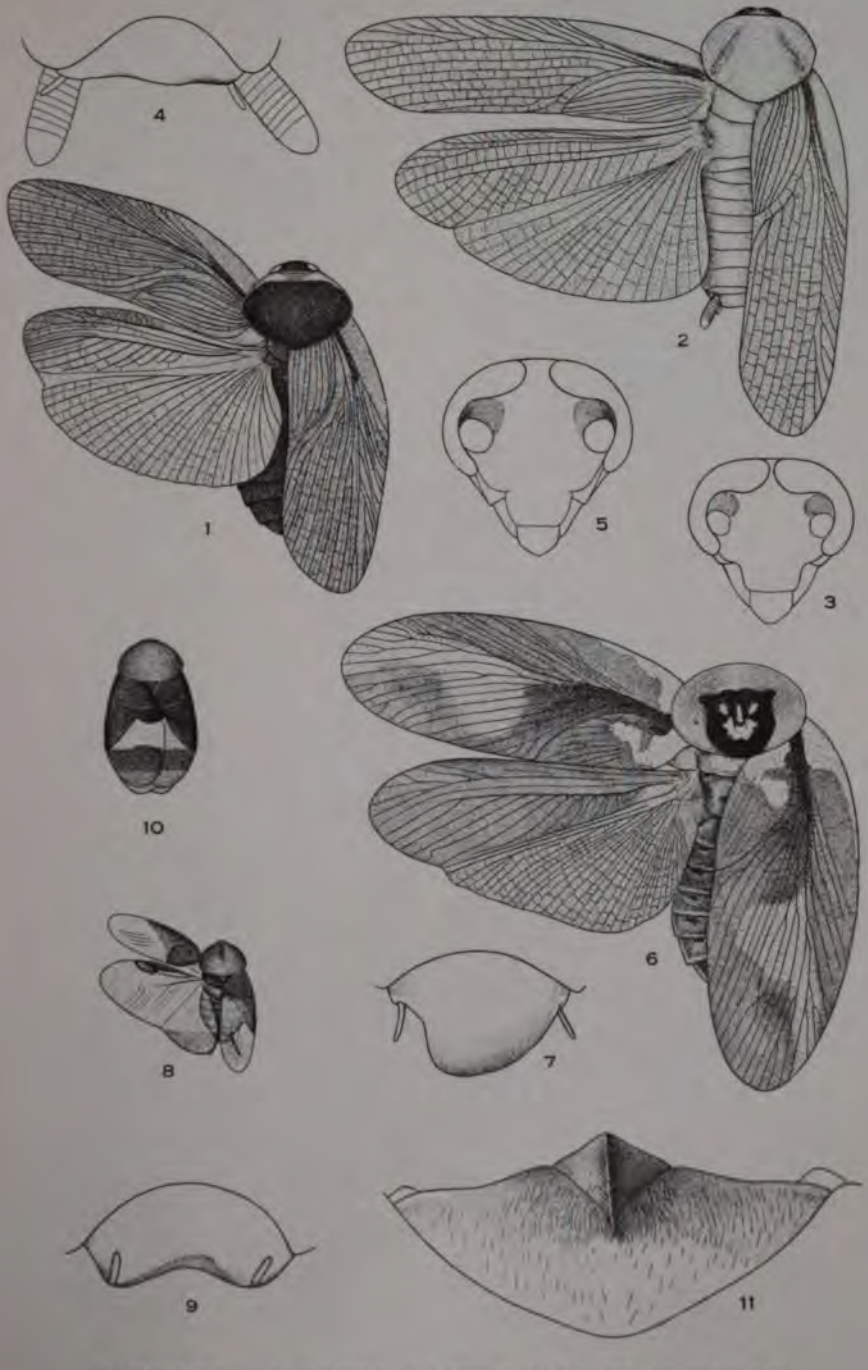

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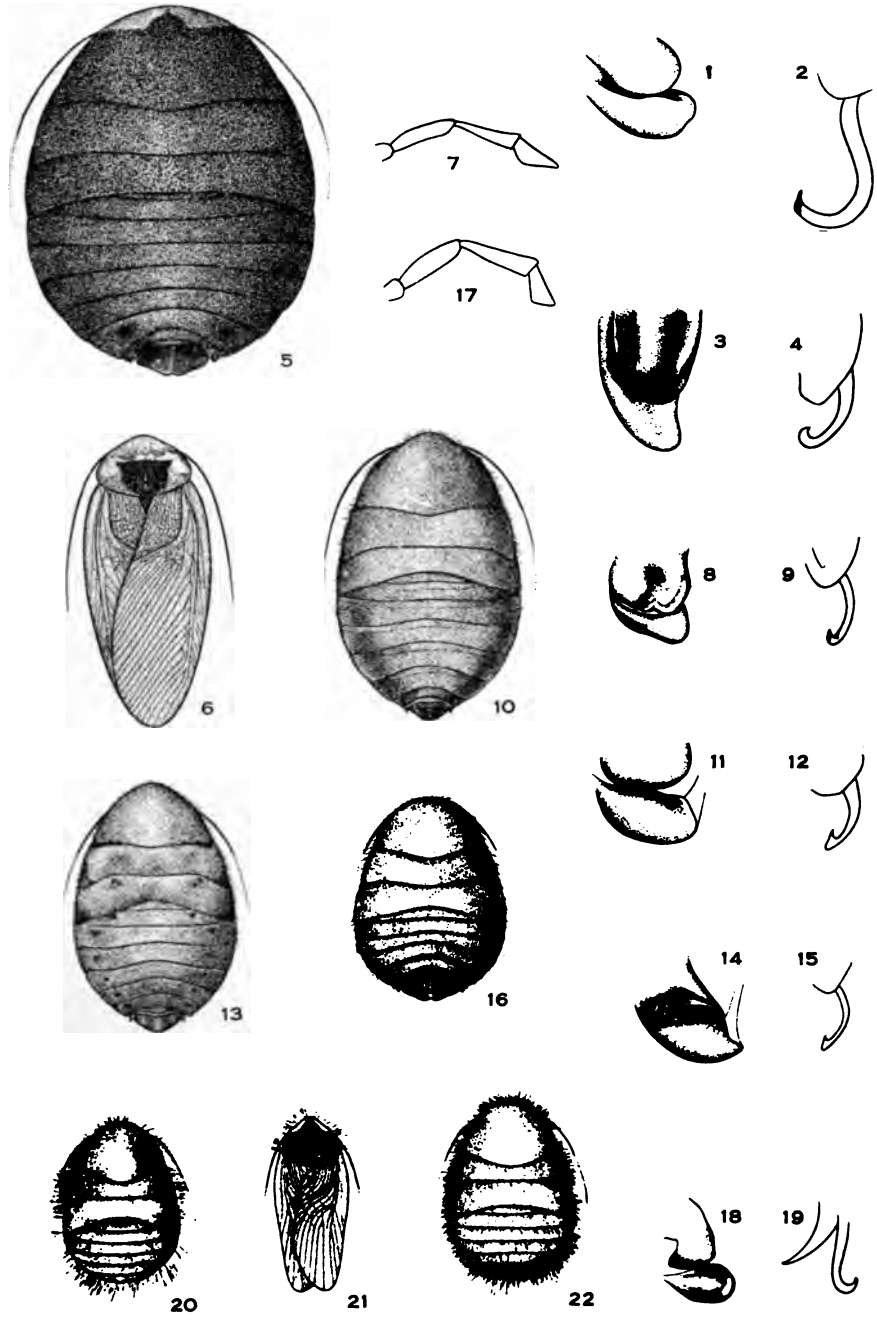

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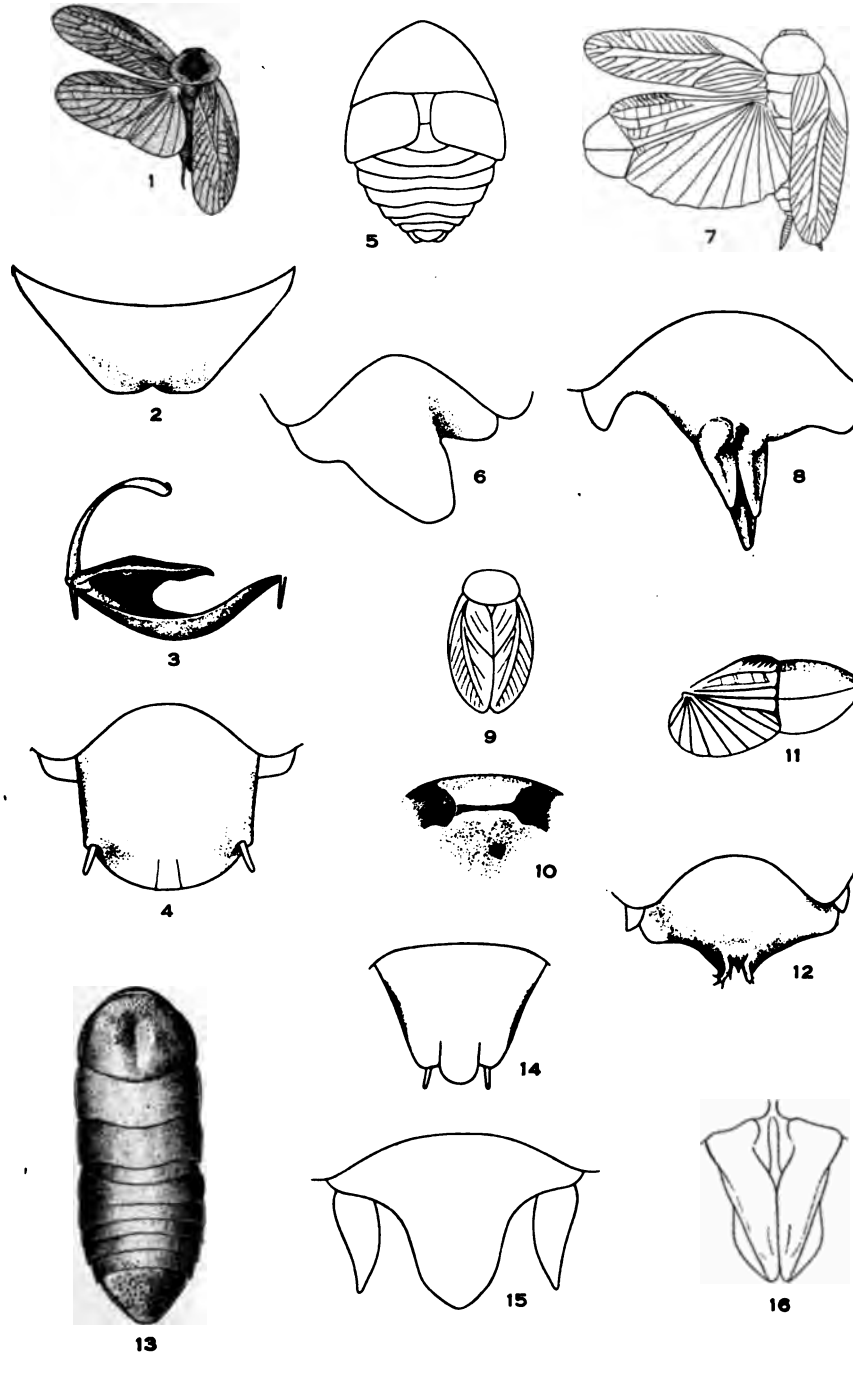

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(ODONATA)

WITH KEYS FOR THE IDENTIFICATION OF GENERA

BY
PHILIP A. MUNZ

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[1] A Contribution from the Entomological Laboratory of Cornell University.

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I—INTRODUCTION

At the present time it is not necessary to offer either explanation or excuse for the use of venation as a guide to the phylogeny of a group of insects, particularly of any of the Neuropteroids, the exceedingly rich and varied veining of which has been the basis of many excellent pieces of work. The purpose of this paper is to make the fullest possible use of wing-veins as a means of interpreting relationships and as a method of identifying the genera of one of the suborders of the Odonata, the Zygoptera. It must be remembered, however, that venation is not the only index to genealogy, nor perhaps always the most reliable, but it is one of the most evident and fundamental and therefore most valuable methods which we have to enable us to determine relationships. In some cases, without doubt, a study of genitalia and morphology will throw more light on the situation and even change some of our conceptions which have been arrived at from the study of the wings only.

The nomenclature of the veins of the Zygoptera and their homologies to those of other groups have been thoroughly worked out, but, since the days of Baron de Selys, no attempt has been made to consider the whole suborder in detail and to make keys for identification. A word of explanation may be permissible in regard to the keys herewith submitted; I have examined such material as I have had access to in an endeavor to make them as generally applicable as possible; but in some cases descriptions only could be used, since during the past two years correspondence with many European workers and hence the securing of many desirable figures have been impossible. I feel, however, that the paper is justifiable, if for no other reason than to have in one place in the literature such wing-photographs as have been collected in the course of the work, the venation of many genera not having been published before.

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Nomenclature of the Wing-Veins

The Comstock-Needham system of naming the veins has come into very general use among workers on the Odonata since the Genealogic Study by Professor Needham in 1903; and it is to be retained in all its essentials as presented in his paper. Tillyard, however, (1914) showed that the vein formerly known as A is in reality partly a secondary structure built back toward the base of the wing from one of the so-called "cubito-anal" cross-veins and

that the vein A at the base of the wing is fused with Cu, but crosses the space back of Cu and then proceeds as formerly thought toward MA. He therefore proposes the name "anal-crossing" (Ac) for this apparent cross-vein, and the abbreviations Ab for the bridge toward the wing-base, and A′ for the distal portion of the anal vein. This system will be used in this paper when especial attention is called to some part of this vein, otherwise A alone will be used to designate the anal vein in general; the sign 1st A is not necessary since the Zygoptera possess only one anal vein. I agree with Mr. Tillyard that the sign A followed by an asterisk as used by Dr. Ris is unfortunate; when I read one of his descriptions I find myself involuntarily looking to the bottom of the page for the foot-note which I always associate with the use of the asterisk.

Mr. Tillyard's contention (1915) and that of Dr. Ris (1916a) that the Zygoptera present a different condition than that of the Anisoptera in the branching of the radius do not seem well founded. To be sure none of the nymphs of the Zygoptera that have yet been examined show the trachea R_s crossing over that of M_{1+2} as do the Anisoptera, however it seems inconceivable that the vein R_s of the Anisoptera can have in the Zygoptera a vein so completely analogous in position and yet not be homologous. Mr. Tillyard's name "median sector" is a matter of words only; it indicates no homology to the veins of any other order, although in retaining the same name for the different branches of media he admits that the media has exactly the same position in both suborders, which state cannot be true if the radius does not present the same condition in both. Professor Needham (1917) has shown how many of Mr. Tillyard's arguments can be used to support the opposite view of the case. I therefore have no hesitation in following the usual system of nomenclature.

As an example of the Agrionidae the genus *Agrion* (*Calopteryx*) may be used with the abbreviations given in fig. A. These abbreviations are given as follows:

C = costa, Sc = subcosta; R_1 = radius-one, R_s = radical sector; M_1 = media-one, M_2 = media-two, M_3 = media-three, M_4 = media-four, M_{1_s} = the longest sector between M_1 and M_2; Cu = cubitus, Cu_1 = cubitus-one, Cu_2 = cubitus-two, Cu_{2_a} = a branch of Cu_2

arising just beyond MA; A = first anal vein, Ac = anal crossing, Ab = anal bridge, A′ = anal vein from Ac to MA; N = nodus, Sn = subnodus; St = stigma, B.S. = basal space, B.R.S. = basal radial space; An = antenodal cross-veins, Pn = postnodal cross-veins, Ar = arculus, MA = medio-anal link; Q = quadrangle, Sq = subquadrangle.

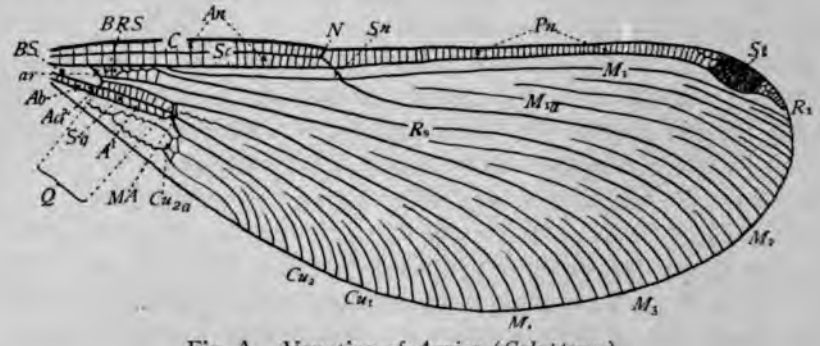

Fig. A. Venation of *Agrion* (*Calopteryx*).

These terms are all familiar ones and need for the most part no definition here. The *subquadrangle* is that space between Ac and MA, and between Cu and A, or Cu and the hind margin of the wing when A′ is not present. Ac cannot always be located because of the numerous cross-veins between Cu and A to be found in some genera, but can generally be distinguished by its obliquity. The term *medio-anal link* is one defined by Mr. Williamson (1913) "as the cross vein forming the distal end of the quadrangle and that part of Cu_2 opposed to Cu, and placed transversely to the long axis of the wing." *Supplementary sectors* are those longitudinal veins present between the principal veins. The quadrangle, subquadrangle, basal space, and basal radial space are said to be *crossed* when they have cross veins, and are *free* when without cross-veins. The basal radial space is *open* when M_{1+2} does not touch R, and *closed* when M_{1+2} fuses with R. Of the antenodals there are two series: those of the *first* or *costal* series, i.e. those between C and Sc; and those of the *second* or *subcostal* series, i.e. between Sc and R.

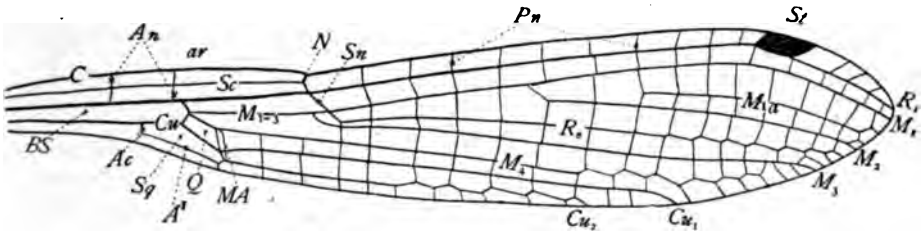

Fig. B. Venation of *Argiocnemis*.

As an example of a wing of the *Coenagrionidae*, *Argiocnemis* may be used, for which see fig. B. The notations are largely as in fig. A, except that there is no *basal radial space* present and that the antenodel spaces are few enough to be numbered; the *first antenodal space* is that between the base of the wing and the first antenodals, the *second antenodal space* is that between the first and second antenodals, and the *third antenodal space* is that between the second antenodals and the nodus. Cu_{2a} is not present.

Explanation of Figures

In referring to figures, A, B, C, etc. are the text figures, while figures 1, 2, 3, etc. are to be found in the plates at the end of the paper.

II—A DISCUSSION OF THE PHYLOGENY

Passing now from a review of the system of nomenclature used, the next step is the consideration of the phylogeny of the Zygoptera and their relationship to other groups.

The Anisozygoptera

In his treatise on fossil insects, Handlirsch (1906–1908) created as a new suborder the Anisozygoptera, for many fossil forms and for the living genus *Palaeophlebia*, to which he gave the name *Neopalaeophlebia*, since the former name was preoccupied. Dr. Calvert (1903), however, had already used the name *Epiophlebia* for *Palaeophlebia* and it is his name that must be used. This genus according to Handlirsch falls as readily into the Anisoptera as the Zygoptera and to keep the two groups distinct, a third intermediate one is necessary. *Epiophlebia* (fig. 1) is the only known survivor of a large suborder of Mesozoic insects and is

therefore of considerable importance phylogenetically. Hence, while it is not now one of the Zygoptera, it deserves discussion in this paper.

Aside from its venational primitiveness it has been shown by Schmidt (1915) to be intermediate between the two modern suborders in the structure of the male genitalia of the second and third abdominal segments. Mr. Kennedy informs me that this is so obviously the case that only a separate suborder will suffice to show its points of difference. The broad area between M_4 and Cu_1 just beyond MA; the shape of the quadrangle, especially that of the hind wing where a cross-vein in the right position would give the supertriangle and triangle of the Anisoptera the zigzag condition of the supplementary sectors,—all these are venational features which justify its position as something quite distinct from the Zygoptera. In itself it does not need to be taken as a form from which the Zygoptera and Anisoptera have descended, in fact it cannot be so considered, but it does show affinities with both and, as a survival of the ancestral group from which our two modern suborders have sprung, it is worthy of note.

The Zygoptera Proper

The Zygoptera may therefore evidently be considered as derivatives of the Anisozygoptera. They may themselves be divided into two families, which were long made subfamilies by workers on Odonata. It would be very desirable and lead to much less confusion if these families could retain the old names; Calopterygidae and Agrionidae, but since most writers on the group have recently followed Kirby's Catalogue in using the genus names *Agrion* and *Coenagrion* rather than *Calopteryx* and *Agrion*, and since Muttkowski (1910) has brought additional evidence to show that these are the names to be used, I shall follow their example and speak of the old group Calopteryginae as Agrionidae and of the former Agrioninae as Coenagrionidae.

Of the generic names proposed, about one hundred and eighty now seem valid and are recognized in the keys hereto appended. Of these about forty come in the first family, the Agrionidae, which is the more generalized of the families and ends in forms very closely related to some of the Coenagrionidae. The two

families, in fact, do not form a dichotomy, but the one leads to the other and is connected with it by so many genera that the dividing line is in some cases difficult to find. In a general way the former one is characterized by the presence of several to many antenodals and by cross-veins generally being present in the quadrangle and subquadrangle. M_3 separates from M_{1+2} nearer to the arculus than to the subnodus, and the nodus is far out in the wing, at from one-third to one-half of the length of the wing. These tendencies in venation are all fairly constant and, as will be shown later, indicate a rather primitive condition. The Coenagrionidae, on the other hand, have two antenodals generally and no cross veins in the quadrangle or subquadrangle, with but few exceptions. In one line only, that of the Lestinae and Lestoidinae, does M_3 retain its original condition of branching off from M_{1+2} near the arculus, in the other groups its point of origin migrates outward. The nodus, however, is drawn toward the base of the wing and ranges in position from about one-seventh to one-third of the length of the wing. The more detailed account of the exact steps in phylogeny may better be discussed under the families and subfamilies.

The *Agrionidae*

As was said before, this family includes the old group Calopteryginae which was divided by de Selys into five legions: *Thore*, *Calopteryx*, *Euphaea*, *Libellago*, and *Amphipteryx*. Venationally these five groups are better arranged in three subfamilies, as was done by Professor Needham (1903a), which I shall call: Polythorinae, to include the legion *Thore;* Agrioninae, for the legion *Calopteryx*, and the Epallaginae, for the last three legions. To these must now be added a fourth subfamily, the Disparocyphinae for the genus *Disparocypha* (fig. 37), recently described by Dr. Ris (1916b). This very remarkable genus will be discussed later with the reasons for its segregation from the others.

The affinities of the Agrionidae with *Epiophlebia* (fig. 1) are evident enough: the large number of antenodals, the origin of M_3 far before the subnodus, and the location of the nodus far out in the wing.

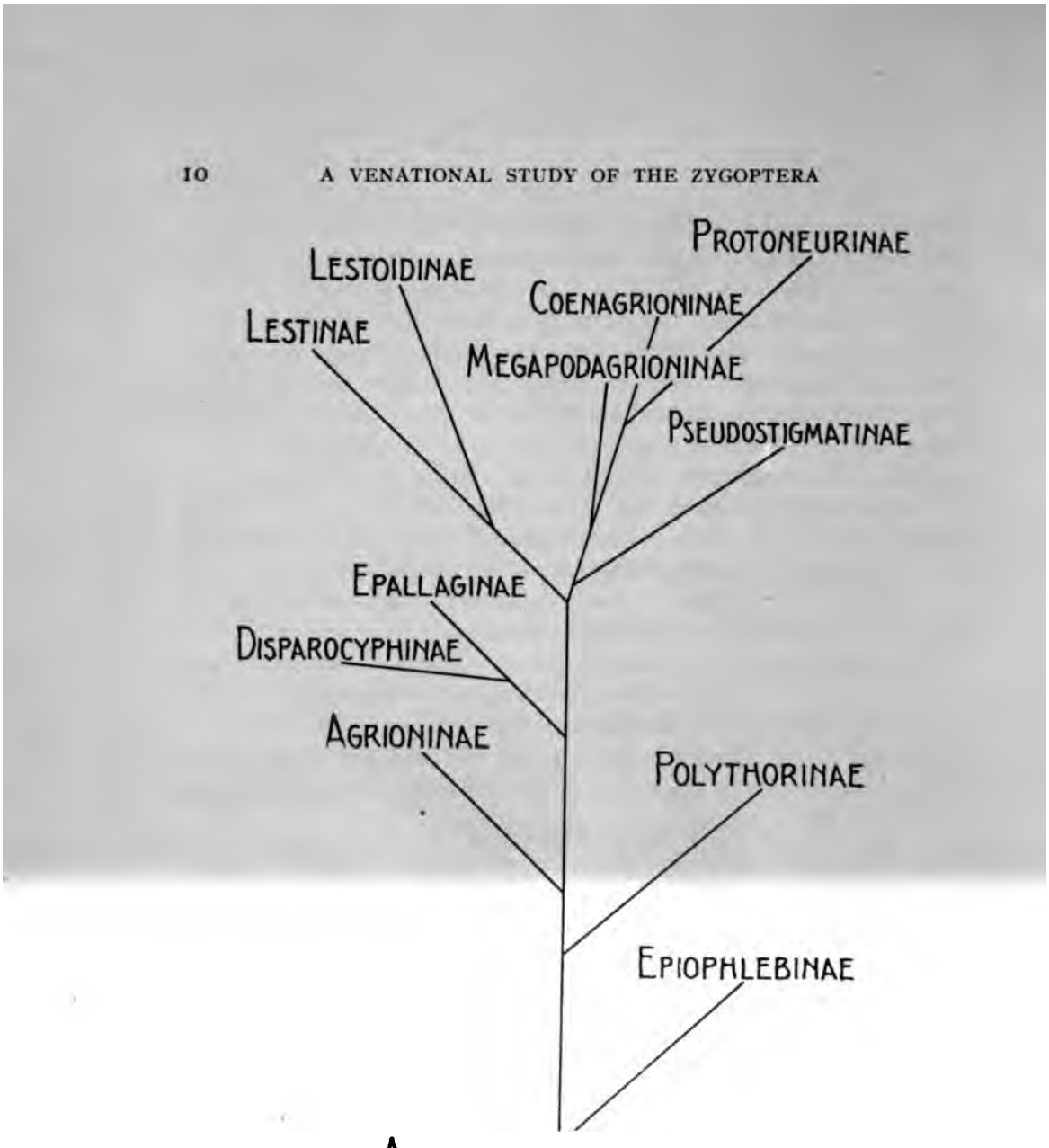

Fig. C. Proposed Phylogenetic Tree for the Zygoptera.

The Polythorinae

The most sharply differentiated group of the Agrionidae, in that it differs most from the others, is the Polythorinae. In it M does not descend the arculus to any extent, so that the quadrangle is very much wider proximally than distally and is concave anteriorly.

This peculiar little group of four genera is a rather compact one, but shows within itself the ever present tendencies of specialization to be found in the other subfamilies. It retains a rich venation with many cross-veins, but has these fewer in number in the higher genera, has petiolation become more advanced, has some of the sectors tend to become attached to the principal veins, and has M_2 becoming branched from M_1 beyond the subnodus. *Polythore* (fig. 2) and *Euthore* (fig. 3) are the two more generalized, *Cora* (fig. 5) and *Chalcopteryx* (fig. 4) the two more specialized genera. The fact that the Polythorinae are discussed first does not mean that they are the most generalized Zygoptera; their quadrangle and the continuing of the direction of M_{1-3} by M_{1+2} rather than by M_3, as well as their petiolation, gainsay this. However, they are the most distinct group and must have separated from the others at rather a low level.

The Agrioninae

Venationally this group is quite distinct from the Epallaginae; however, Schmidt (1915) working on the male genitalia, finds there no basis for such a division. The Agrioninae consists of the Vestalinae as defined by Dr. Needham (1903a) and can be distinguished from the Epallaginae and Disparocyphinae by the following venational tendencies: M_{1a} has a course parallel to that of M_2, the stigma becomes diffuse and finally atrophies altogether; and the vein Cu_2 in most forms has a branch Cu_{2a} running toward the hind margin of the wing. *Vestalis* (fig. 18), *Heterina* (fig. 19) and *Lais* (fig. 20) do not possess this branch, but the facts that the stigma may be lost, that M_{1a} is parallel to M_2, that the quadrangle becomes convex above, that some of the sectors tend to become attached to the longitudinal veins, and that there is no petiolation, and but slight reduction in the number of antenodals, indicate affinities with the Agrioninae rather than the Epallaginae. The subfamily Agrioninae has its own methods of specialization, but its line ends in itself and shows no relationship to higher forms.

Aside from the *Vestalis-Heterina-Lais* group, which is the most distinct, the remaining genera can be divided into those which have Cu_{2a} running perpendicular to the hind margin of the wing or toward the base of the wing, and those in which it is bent away

from the base of the wing. The former group begins with such genera as *Archineura* (fig. 8) and *Echo* (fig. 7) and continuing through *Umma* (fig. 9), *Sapho* (fig. 10) and *Agrion* (fig. 11), ends with *Matrona* (fig. 13), *Matronoides* (fig. 12), and *Neurobasis* (fig. 14). The latter group consists of *Mnais* (fig. 15), *Psolodesmus* (fig. 16), and *Phaon* (fig. 17), which approach *Vestalis* (fig. 18) in some respects; for example in the attachment of sectors, in the convexity of the quadrangle above, and in the general wing proportion and number of cross-veins.

The Epallaginae

The discussion now leads to perhaps some of the most generalized of living Zygoptera: the genera *Pseudophaea* (fig. 21) and *Dysphaea* (fig. 22). It is here that one must look for the beginning of the line which leads to the higher family by reduction in the number of cross-veins and of the supplementary sectors, by the location of M_{1a} halfway between M_1 and M_2, and especially by the bending of M_3 and R_s away from M_{1+2} so that it is the latter vein rather than M_3 which continues the direction of M_{1+2+3}. All the genera so far discussed under the Zygoptera, except the Polythorinae, have M_3 in line with M_{1+2+3}, but in the higher members of the Epallaginae it is no longer the case. Petiolation too proceeds to a high degree of advancement and the stigma persists. Beginning then, with *Pseudophaea* (fig. 21) and *Dysphaea* (fig. 22) a series can be arranged (as has been done in the key to the Epallaginae) which proceeds by reduction and petiolation through *Bayadera* (fig. 23), *Epallage* (fig. 24), *Anisopleura* (fig. 25) and *Rhinocypha* (fig. 26) to *Micromerus* (fig. 28) where the new condition is first evident as regards the base of M_3. *Rhinocypha* (fig. 26), *Libellago* (fig. 27), and *Micromerus* (fig. 28) form rather a compact and distinct group with M_4 arching forward and Cu_2 backward, more so than in the related genera and with R_s and M_2 parallel at their tips and with two prominent sectors between. *Cyanocharis* (fig. 29), *Caliphaea*, *Heliocharis* (fig. 30), *Dicterias* (fig. 32) and *Neocharis* (fig. 31) carry on the reduction process until in *Devadatta* (fig. 33) and *Amphipteryx* (fig. 34) the continuing of M_{1+2+3} by M_{1+2} is again evident and firmly established. *Diphlebia* (fig. 34) is enough

like a low form of the Lestinae to be taken for one but for the presence of too many antenodals; and in *Philoganga* (fig. 36) is to be seen the beginning of the tendency for R_s and M_3 to arise nearer the subnodus. Thus the evolutionary steps in the Epallaginae are in marked contrast to those in the Agrioninae.

The Disparocyphinae

The genus *Disparocypha* (fig. 37) is placed by Ris in the legion Libellago and it is clearly related to that group. But its characters of difference are so great that to be consistent with the arrangement in the higher subfamilies, it must be placed in a separate one. It differs from the members of the legion Libellago as much as the Protoneura group does from the Coenagrion group or the genus *Lestoidea* (fig. 45) from *Lestes*. Cu_1 is short, not extending to the level of the subnodus; Cu_2 is reduced to a cross-vein; A ends in the hind margin of the quadrangle; M_4 is almost perfectly straight in its entire length; and the stigma is very much broader distally than proximally.

This reduction of Cu_1 and Cu_2, which seems to be a very highly specialized tendency, will be discussed again under *Lestoidea* (fig. 45) and *Protoneura*. Its occurrence in three widely separated groups is indeed an interesting parallelism.

The *Coenagrionidae*

As the two families now stand they can conveniently be separated by placing in the Agrionidae those genera with five or more antenodals and with M_3 arising nearer the arculus than the subnodus. Of the Coenagrionidae those with more than two antenodals have M_3 arising near the subnodus and often have the nodus very near the base of the wing, while those with M_3 arising near the arculus have only two antenodals. Now from this state of affairs it is evident that the division into two families is somewhat artificial and yet, I think, it is a tenable one and it certainly is convenient. The higher family includes only more specialized forms than the lower; the only difficulty in the whole situation is that our series from one to the other is too complete to make the divisions clearly marked. From the phylogenetic standpoint this condition is of course fortunate. *Diphlebia* (fig. 34) and related genera show very evident affinities to the Lestinae among the

Coenagrionidae, especially in the position of the base of M_3 and of R_s and in the petiolation and general arrangement of veins. It connects the Lestinae to the Epallaginae through the genera *Pseudolestes* and *Ortholestes*, and differs from these forms chiefly in the number of antenodals. On the other hand, the Lestinae are related very closely to the Megapodagrioninae by *Rhipidolestes* (fig. 52). Yet in this same group of Megapodagrioninae it is necessary to include *Thaumatoneura* (fig. 51), which with its number of antenodals and abundant sectors indicates a descent from some Agrionid, possibly one like *Philoganga* (fig. 36) in which the quadrangle is short, and M_3 and R_s arise at some little distance beyond the arculus. The retraction of the nodus in a form like *Philoganga* would bring about a condition comparable to that in *Thaumatoneura*, except for the numerous sectors and many crossveins of the latter. As will be shown later, *Thaumatoneura* in turn leads to the Pseudostigmatinae and to the other Megapodagrioninae, which by reduction approach the Coenagrioninae and these in their turn are connected with the Protoneurinae. After this additional evidence is presented, it will be seen that it is a very logical thing to consider the Coenagrionidae merely a specialized offshoot or number of offshoots from the Agrionidae, as arranged in the tree in Figure C.

In this connection the following quotation is of interest. Tillyard (1914b) in discussing the classification of the Zygoptera declares, "It becomes now more than ever apparent that the Selysian division into *Calopterygidae* and *Agrionidae* is quite untenable as a natural dichotomy, more than this, it is pretty clear also that the *Zygoptera* are not like the *Anisoptera*, derived from an original pure line descent. Triangle-formation most certainly started once; and, however far back new fossil discoveries may take us as regards the first formation of the triangle, there can be no doubt about the origin of all *Anisoptera* from that single line of descent, which Palaeontology already places as far back as the Trias, and which probably began in the Permian period. Most of the *Zygoptera* (certainly all those with regular quadrilaterals) must have branched away from the *Anisoptera*-line before this. But who can tell how

many separate branchings took place, even amongst this one portion of the Suborder? The origin of the tribe *Agrionini*[2] is doubtful, for their acute quadrilateral might yet be proved to be the reduced remnant of an originally weak *Anisopterid* triangle-formation. Finally, standing out clear from all the rest as the most recent offshoot from the *Anisopterid* line, we see the *Epiophlebia-Synlestes-Lestes* line of descent, which branched off from that line *not very far from* the beginnings of the *Gomphinae*, and whose sharply angulated quadrilateral is almost certainly an *Anisopterid* remnant."

Following out his theory, Mr. Tillyard places this "line of descent" in a family Lestidae and divides it into the following subfamilies: Epiophlebinae, Lestinae, Synlestinae, and Heterophlebinae, the last named containing fossils only. It is now known that *Epiophlebia* (fig. 1) is far from being near the Lestinae not only venationally, but on the basis of the genitalia, it is of far too generalized a nature to be placed near them, although an oblique vein between M_2 and R_5 is present in both subfamilies and many of the sectors are very zigzag. The Zygoptera cannot be considered as derived from the Anisoptera, but form a dichotomy with them, both arising from the ancient Anisozygoptera. The argument that all Zygoptera with the regular quadrangle are primitive is also unfounded; the regularity of the quadrangle, that is, its squareness distally, is not so fundamental a thing as it might seem. Those forms which are perhaps the most highly specialized, those in which Cu_2 is reduced to a cross-vein, have the square quadrangle; yet this condition arises independently three times, in *Disparocypha* (fig. 37), in *Lestoidea* (fig. 45) and in the Protoneurinae. I cannot, therefore, agree with any of the views expressed in the above quotation as regards the phylogeny of the Zygoptera. This subject can, however, be more fully discussed in treating each subfamily independently.

The Lestinae

The Lestinae, as has been said before, include those Coenagrionidae in which the vein M_3 arises nearer the arculus than the subnodus, therefore it comprises the legion *Lestes* of de Selys. This feature is an ancient and primitive one and specialization in this

[2] Agrionini is Coenagrionidae of this paper.

group has been in a different direction from that in the other Coenagrionidae. The presence of the *oblique* vein between M_2 and R_3 is of course a character recalling the condition to be found in the *Anisoptera*, but it seems to be a rather dangerous one on which to depend too extensively if it means that *Epiophlebia* must be placed in the same category as the Lestinae. *Pseudolestes* (fig. 38) and *Ortholestes* (fig. 39) have the general venation of the Lestinae and are intermediate between the higher Lestine genera and *Diphlebia* (fig. 34). Yet they do not possess the oblique vein, at least it is not distinct. Cannot this cropping out of a primitive feature be a secondary matter, a reappearance? It is evidently so in the case of the square quadrangle of *Protoneura*, *Lestoidea*, and *Disparocypha*. A single character is dangerous to use too far to the exclusion of others, although it may sometimes seem necessary to do so. The oblique vein is present also in *Chlorolestes* (fig. 66) and *Synlestes* (fig. 63) yet the rest of the venation does not suggest the Lestinae. This oblique vein is of course present in those genera in the nymphs of which the trachea for R_3 is joined to the trachea for M_2. Whether this attachment of the trachea is to be taken as more or less important than the adult venation is the question. It seems reasonable to lay more stress on the latter since in it several other characters unite in placing *Chlorolestes* and *Synlestes* in the Megapodagrioninae.

Pseudolestes (fig. 38), *Ortholestes* (fig. 39) and *Rhipidolestes* (fig. 52) show a connection between the Lestinae and Megapodagrioninae, and these two subfamilies can be considered as offshoots from the same general region of the Agrionidae. Their close affinity warrants the retention of the subfamily name for the Lestinae rather than the use of a family name. Of the forms included here under Lestinae *Pseudolestes* (fig. 38) is undoubtedly the most primitive, in having the quadrangle like that of *Diphlebia* (fig. 34) and in its large number of supplementary sectors. *Ortholestes* (fig. 39) comes next and is followed by the Lestine genera proper: *Archilestes* (fig. 40), *Megalestes* (fig. 41), *Orolestes*, *Platylestes*, *Lestes* (fig. 44), *Sympycna* (fig. 42), etc. The general tendency is that of reduction, combined with straightening of the veins at the tips. Many sectors and veins are somewhat zigzag, and there develops

also a narrowing and sharpening of the quadrangle distally. Petiolation does not proceed very far, never to the level of the arculus.

The Lestoidinae

Mr. Tillyard (1912a) described as a new genus a very peculiar form which he called *Lestoidea* (fig. 45) and for which he proposed a new legion of the same name. This remarkable insect has decided Lestine affinities in the location of the base of M_3 and R_s, but has the vein Cu_2 reduced to a cross-vein and Cu_1 but one cell long. Yet in addition to the above characters it is distinguished from all Protoneurinae by the presence of two sectors between M_1 and M_{1a}.

The decrease in length of Cu_1 and Cu_2 is one of the most extreme tendencies in specialization occurring in the Zygoptera and its origin in the various groups is an interesting parallelism. As always happens when Cu_2 is thus reduced MA is straightened and the quadrangle ends squarely. The retention of the two sectors between M_1 and M_{1a} is rather remarkable, in view of the fact that all others are gone and that in none of the Lestinae are there any long sectors between these two veins. *Lestoidea* must therefore have arisen from some rather ancient form and is distinct enough to merit a legion for itself or in the system here used, a subfamily.

The Megapodagrioninae

Here are included the genera ordinarily considered as belonging to the legion Podagrion of de Selys; this is the group which leads to the higher members of the Coenagrionidae. The genus most distinct from the others is undoubtedly *Thaumatoneura* (fig. 51), which has been given much attention by various workers. McLachlan (1897) and Foerster (1909) referred it to the Agrionidae; Needham (1903a) spoke of its affinities to the Pseudostigmatinae and Calvert (1913) placed it in the Megapodagrioninae. All agreed that it was an intermediate form. The safest course to follow seems to be to leave it in the Megapodagrioninae, but to call attention to the fact that it shows an undoubted approach to the Pseudostigmatinae. It is unquestionably one of the *Coenagrionidae* although it does have more than two antenodals. *Neurolestes* (fig. 62), *Trineuragrion* (fig. 54), and often *Neuragrion* have three antenodals as the normal condition, so that the old idea of

two as being an infallible means of determining Coenagrionidae must give way, as has been stated by previous workers. The retraction of the nodus is a more fundamental difference than the retention of four or five cross-veins and must place the genus in the higher family. Now as to its subfamily; it is convenient to limit the Pseudostigmatinae to those genera in which the stigma becomes diffused and which have M_{1a} following M_2 rather than M_1. If this is done, *Thaumatoneura* may be placed near the base of the *Pseudostigma* line. I can readily see, however, that its general vein-arrangement, its large postnodal area, its broad area behind Cu and its retracted nodus may indicate a condition near enough to that of *Megaloprepus* (fig. 46) to warrant placing the two in the same subfamily.

To return to the general discussion of the Megapodagrioninae, it may be said that *Rhipidolestes* (fig. 52) in the position of the base of M_3 shows a decided affinity to the *Lestinae*, to separate it from which is perhaps as artificial an arrangement as to divide *Thaumatoneura* from the Pseudostigmatinae. The extreme petiolation and long narrow quadrangle, however, of *Rhipidolestes* throw it in this subfamily, which may be said really to begin with *Podopteryx* (fig. 53). From there on, the adult venation at least, gives a well connected series which has been carefully discussed by Dr. Calvert (1913). As nearly as they can be made to do so the keys show my interpretation of its evolution. M_3 and R_s at their points of attachment move outward to beyond the subnodus, the quadrangle becomes elongate, the wing reaches the extreme of petiolation, and the number of supplementary sectors is reduced to none other than M_{1a}.

Tillyard (1914), on the basis of the presence of the oblique vein formed the Synlestinae as a group including such genera as *Chlorolestes* (fig. 66) and *Synlestes* (fig. 63), and placed them with the Lestinae. But, as has been shown, this was a dangerous undertaking. According to Schmidt (1915) the genera *Chlorolestes* (fig. 66) and *Synlestes* (fig. 63) belong to the *Lestinae* on the basis of the structure of the male genitalia; his figures, however, fail to show any very close connection. Venationally they are not to be placed in the Lestinae; M_3 arises very near to or at the subnodus although

the general wing proportions are those of the Lestinae, in which it arises far before the subnodus: petiolation has proceeded to the level of half the length of the quadrangle; in the Lestinae it does not reach the arculus. It is true that Cu_1 arches forward just beyond MA as in *Lestes* (fig. 44), but that is the case in some other genera as well; for example *Chorismagrion* (fig. 69) and *Trineuragrion* (fig. 54) and *Dimeragrion* (fig. 67) to a certain extent. *Rhipidolestes* (fig. 52) in its venation is nearer to *Lestes* (fig. 44), but Schmidt considers it much nearer *Megapodagrion* (fig. 57) itself on the basis of the penis.

I have spoken before of the progressive reduction of the sectors in the Megapodagrioninae until all except M_{1a} are gone; when this state is arrived at, the condition to be found in the Coenagrioninae is present. But there are two genera which agree with the Coenagrioninae in this respect, but which seem better retained in the Megapodagrioninae. These are *Chorismagrion* (fig. 69) and *Perilestes* (fig. 70); their extreme petiolation, the remote origin of R_s and M_s, the arching forward of Cu_1 beyond MA, and the heavy stigma of *Chorismagrion* are indicative of affinity to *Synlestes* (fig. 63) and *Heteragrion* (fig. 68) and through its likeness to *Chorismagrion*, *Perilestes* is to be placed at the apex of the *Megapodagrion* line.

Just the fact, then, of the presence or absence of supplementary sectors is not a safe criterion by which to separate the Megapodagrioninae from the higher forms. It is indeed an accompaniment of specialization and reduction and is a convenient character to use. Generally mere presence or absence is not so reliable a matter as might be supposed, since two forms without a given character may have arisen independently from two very distinct ancestors, one with the character present in one way, another with it in quite a different way.

It is probable, however, that the forms placed by de Selys in the legions *Agrion* and *Platycnemis* have been derived from others, closely related to *Megapodagrion* (fig. 57), in which petiolation has not reached the level of Ac and in which M_3 arises before the subnodus. A wing like that of *Megapodagrion* with the supplementary sectors removed would be much like *Platycnemis* (fig. 74). Perhaps the distinction between the legion *Podagrion* on the one hand,

and *Platycnemis* and *Coenagrion* on the other is hardly great enough to merit their being placed in separate subfamilies, but it may be done, if it is kept in mind that the groups are close to each other and that the second is an offshoot from the first.

So much may suffice for a discussion of the Megapodagrioninae; those groups to which it has given origin may now be discussed.

The Pseudostigmatinae

As here used, this subfamily includes the Anormostigmatini of Kirby's Catalogue, and is characterized by a diffusion of the stigma, by having M_{1a} parallel to M_2 rather than to M_1, and by a very retracted nodus with a long postnodal portion which has many cross-veins and with the longitudinal veins running far out into the wing. These insects are as specialized in a venational way as in their elongate abdomens and peculiar habit of life, the nymphs living in the small pools in epiphytic Bromeliads. If it were not for the genus *Thaumatoneura* (fig. 51) they would stand so far removed from all other Zygoptera as perhaps to deserve a separate family.

Megaloprepus (fig. 46), however, the most generalized of the five genera, has so many points of similarity to *Thaumatoneura* that there can be no doubt of their relationship. They agree in the width and general proportions of the wings, in the presence of abundant sectors and the position of the nodus. *Megaloprepus* shows a more generalized condition than the remaining genera in the short quadrangle, the broad area back of Cu_2 with many attached sectors, and in the fact that the stigma while diffuse is not so much so as in the others.

Within the group the same tendencies of specialization appear as in other groups: loss of sectors, narrowing of the wing, reduction in number of cross-veins, straightening of veins, elongation of the quadrangle, and petiolation of the wing. Next to *Megaloprepus* comes *Microstigma* (fig. 47), with the quadrangle about five times as long as wide and with M_{1+2} forking more than half the distance from the subnodus to the tip of the wing. In these respects these two genera differ from *Anomisma* (fig. 48), but agree with it in having many secondary sectors and with Cu_2 bearing many branches. *Anomisma* is peculiar in being a genus of Coenagrionidae having a crossed quadrangle, *Pseudostigma* (fig. 49) and *Mecistogaster* (fig.

50) have few sectors and no branches to Cu_2. *Mecistogaster* is the most specialized of all, with a single row of cells behind Cu_2 and between M_{1a} and M_2. It is interesting to note that in this group the tendency is for the nodus to approach a more normal position in the wing, so that in *Mecistogaster* (fig. 50) it is at one-fourth the length of the wing, while in *Megaloprepus* (fig. 46) it is at one-seventh.

The Coenagrioninae

Baron de Selys created two legions, *Platycnemis* and *Agrion*, for the reception of genera which fall, it is true, into two groups, but these have no definite nor sharply defined differences. In general it can be said that the quadrangle of the first of these groups has a relatively long upper side, hence that the outer angle is not very acute, but there are exceptions to this, as for example in *Leptocnemis* (fig. 80); in the second legion there are exceptions to the obliquity of the quadrangle, since some of the more specialized forms, as *Hemiphlebia* (fig. 106) and *Agriocnemis* (fig. 104), have a fairly regular one. For that reason a recent key to subfamilies of the Zygoptera does not hold as applied in the following quotation:

"Quadrilateral regular.....Subfamily *Platycneminae*.
Quadrilateral irregular, usually with distal angle sharply acute.
Subfamily *Agrioninae*."[3]

Now these two groups have many points in common; they have no supplementary sectors other than M_{1a}, they have the stigma rather short as compared with that of the Megapodagrioninae and they have Cu_2 well developed. Since they do grade so from one into the other, and are so fundamentally related, I cannot follow the above example and place them in separate subfamilies; in fact, I am not absolutely sure that as many such divisions ought to be recognized as I have already done in this paper, that is, whether these "subfamily" groups are really equivalent to subfamilies in other orders.

This placing both in one group does not indicate, however, that my feeling is that the legions *Platycnemis* and *Coenagrion* are not rather distinct. Although the quadrangle alone does not suffice in

[3] Agrioninae is here used for the legion Agrion of de Selys, hence it is equivalent to the Coenagrioninae of this paper minus the Platycnemis group.

all cases to separate the two, the general wing proportion and arrangement of the veins do. In *Platycnemis* (fig. 74) and its allies the wing is long and with the longitudinal veins arranged in a very regular and parallel fashion. The cells are largely square or rectangular, while in the group containing *Coenagrion* (fig. 94) there is a tendency for M_{1+2} to bend posteriorly at the subnodal region and for M_4 and Cu_2 to be zigzag so that many cells are pentagonal. The methods of specialization in the two groups are also different, in the *Platycnemis* series are retained some of the features to be found in the Megapodagrioninae; for example, (1) great petiolation which may extend beyond the level of the arculus, and (2) an outward migration of the base of R_s to a considerable distance beyond the subnodus. In the second group, on the other hand, petiolation is delayed for a long time, so that it never reaches the level of the arculus, and R_s arises beyond the subnodus in *Amphicnemis* (fig. 129) only. Many of the *Coenagrion* group are further specialized by a great reduction in the number of cross veins in the wing.

To come now to the discussion of the legion *Platycnemis* in detail, it is perhaps to be noted first of all that this may not be a natural group, it may represent a collection of forms each of which is the result of the dropping out of sectors from some corresponding Megapodagrionine. If *Megapodagrion* (fig. 57) itself, by way of example, were to lose its supplementary sectors, the resulting venation would be much like that of *Platycnemis* (fig. 74) or *Calicnemis* (fig. 72). The same might be true of *Wähnesia* (fig. 65) and *Tatocnemis* (fig. 78), of *Heteragrion* perhaps, (fig. 68) and of *Prionocnemis* (fig. 79). However this may be, and although these genera resembling *Platycnemis* may not have come from a common ancestor, they do form a remarkably close and well connected series beginning with *Metacnemis* (fig. 71), *Calicnemis* (fig. 72), and *Platycnemis* (fig. 74), in which the wing is not petioled to the level of Ac, and R_s begins at the subnodus. Proceeding through *Idiocnemis* (fig. 75), *Coeliccia* (fig. 76), and *Allocnemis* (fig. 77), petiolation and the outward movement of the base of R_s advance until the two tendencies reach their culmination in *Tatocnemis* (fig. 78) and *Prionocnemis* (fig. 79) respectively.

Leptocnemis (fig. 79) and *Paracnemis* which are rather typical forms of the *Platycnemis* group, except in the proportions of the quadrangle, and *Antiagrion* (fig. 81) a segregate of the old genus *Coenagrion* itself, offer themselves as transitional genera to the remaining Coenagrioninae.

These other genera in turn, can be divided into two groups: the *Argia* group and that of *Coenagrion* proper. In the former the inner end of the quadrangle is generally longer than the upper part of the arculus and as long as the upper side of the quadrangle, which is widened distally. Another character, not venational, is the presence of long tibial spines. This group has its own evolutionary line which begins with *Hyponeura* (fig. 82) and *Palaiargia* (fig. 83) and proceeds by greater petiolation, shortening of Cu_2, and reduction of the number of postnodals through *Argia* (fig. 84) to *Argiallagma* (fig. 86) and *Diargia* (fig. 85).

Of the *Coenagrion* group proper, it may be said that venation offers fewer marks for identification than in any other group of the Zygoptera, and it is here that keys for determination must be artificial. The genera are so numerous and so much alike that other characters are necessary for their differentiation. Venation does, however, indicate the general tendencies of phylogeny. Mr. Tillyard (1912) may be quoted as follows, "Those forms are the least asthenogenetic in which the basal postcostal nervule[4] is closest to the base of the wing, the petiolation consequently least marked, and the inferior sector of the triangle longest and best developed. Such forms, while marking the 'high-water mark' of successful coenogenetic specialisation in the legion, must nevertheless be considered to be more in line with the ancestral stem of the group than are their asthenogenetic off-shoots." Following this theory, one can readily arrange a series which begins with *Oreagrion* (fig. 87) and *Pyrrhosoma* (fig. 89) and, by a shortening of Cu_2 and a reduction in the number of postnodals, continues through *Enallagma* (fig. 98), *Ischnura* (fig. 100) and *Coenagrion* (fig. 94) to another dividing point, one branch leading off in the direction of reduction in size and further decrease in the number of postnodals until *Ceratura* (fig. 102), *Anomalagrion* (fig. 97), *Agriocnemis* (fig. 104)

[4] Basal postcostal nervule is the vein Ac of this paper. Inferior sector of the triangle is Cu_2.

and *Hemiphlebia* (fig. 106) are arrived at; the other branch develops by a greater petiolation, which extends to or beyond Ac in those genera above *Pseudagrion* (fig. 114). This line continues through *Oxyagrion* (fig. 109), *Acanthagrion* (fig. 110) and others until a new tendency is observable, namely the movement outward of the base of M_3, until the origin of this vein very nearly coincides with that of R_2. This is true of such genera as *Nesobasis*, *Aciagrion* (fig. 123), *Leptobasis* (fig. 127) and *Teinobasis* (fig. 128). In *Amphicnemis* (fig. 129) the base of M_3 reaches the subnodus and R_2 arises a cell beyond, while petiolation extends at least to the level of the arculus.

To return for a moment to the discussion of *Ceratura* (fig. 102), *Anomalagrion* (fig. 97) and their allies; there are to be found here several very interesting and peculiar conditions. The male of *Anomalagrion hastatum* in the fore-wing has the stigma small and three-sided, with the apex of this triangle not reaching the margin of the wing, and with the base on R_1. *Ceratura* (fig. 102), *Austrocnemis* (fig. 104) and *Hemiphlebia* (fig. 106) have the second antenodals placed before the arculus, and have only from five to seven postnodals, while Cu_2 extends but a few cells beyond the level of the subnodus. In *Austrocnemis* and *Hemiphlebia* petiolation extends almost to Ac, since Ab and Ac are in line with each each other, A′ does not begin at the wing margin and the other characters above mentioned place these two genera in this line rather than in the *Leptobasis* one. The absence of the inner end of the quadrangle in the fore-wing of the male of *Hemiphlebia* (fig. 106) is an unusual state of affairs, and an interesting parallelism to the Megapodagrionine *Chorismagrion* (fig. 69) recently described by Morton (1914).

The Protoneurinae

This subfamily, the most specialized one among all the Zygoptera, includes the legion Protoneura of de Selys. It is distinguished primarily by the reduction in length of Cu_2 which is generally represented by a cross-vein only. In fact, this character was the one first used by de Selys to determine whether a genus belonged in the legion or not. On the discovery of *Proneura prolongata* (fig. 131), in 1889, with the vein Cu_2 one cell long, he modified the definition

of the legion to include this form and the genus *Chlorocnemis* (fig. 130) which is likewise characterized by having Cu_2 one cell in length. It is of course evident that these two genera are intermediate between the old legions Agrion and Platycnemis proper. Yet they are closer to the latter and may easily be considered as coming in the same subfamily with it.

Chlorocnemis (fig. 130) with its general wing proportions and arrangement of veins is a genus connecting *Platycnemis* (fig. 74) with such genera as *Palaemnema* (fig. 136) and *Platysticta*, which also have a long postnodal area with the longitudinal veins very regularly and evenly placed. *Proneura* (fig. 131), on the other hand, shows its affinities with the *Coenagrion* group on the one side and *Neoneura* (fig. 133) and related genera on the other, in it are found the pentagonal cells near M_4, the bend of M_{1+2+3} before the subnodus, and the small number of the cells of the wing and a short vein M_{1a}.

After Cu_2 has become reduced, the next step in the evolution of the *Protoneurinae* seems to have been the atrophy of that part of the anal vein beyond Ac. Thus in *Disparoneura* (fig. 132), *Peristicta* (fig. 134), *Neoneura* (fig. 133), and *Idioneura* (fig. 135) it extends to the medio-anal link; in *Palaemnema* (fig. 136) and the old genus *Platysticta* (fig. 137) it ends before MA on the posterior edge of the quadrangle, and in *Hypostrophoneura* on the hind margin of the wing. In the higher forms it does not extend beyond Ac, which then is generally moved nearer the base of the wing until in *Nososticta* (fig. 151), *Isosticta* (fig. 150), and *Selysioneura* (fig. 153) it lies before the level of the first antenodals. At the same time Cu_1 becomes shorter and the whole line culminates in *Selysioncura* (fig. 153), which has only a cross-vein for both Cu_1 and Cu_2. In its absence of sectors other than M_{1a}, in the reduction of Cu_1 and Cu_2, in the origin of both R_s and M_s beyond the subnodus, in the absence of that portion of A beyond Ac, in the retracted position of Ac, and in the fact that the second antenodals lie before the arculus, this genus presents a combination of characters of so high a degree of specialization that it can hardly be equalled in its reduction by any other member of the Zygoptera. It is therefore fitting that it should be placed at the very apex of the genealogic

tree of the suborder, and should bear the name of the man who has done more than any other worker to further our knowledge of the Odonata, namely Baron de Selys-Longchamps.

In contrast to the Coenagrioninae the Protoneurinae do not have the reduction in the number of postnodals, they are as numerous in *Selysioneura* (fig. 153) as in *Disparoneura* (fig. 132).

III—TENDENCIES IN SPECIALIZATION

These have been rather fully discussed in previous papers, particularly by Dr. Needham (1903a) for the order Odonata as a whole, and by Dr. Calvert (1913) for the Zygoptera with special reference to the Megapodagrioninae. It is my purpose here to review their opinions and to add a few observations of my own.

I think it must be apparent from the preceding discussion on the phylogeny that the outstanding features in the development of the Zygoptera are a constant reduction and simplification of venation. At any rate this is true from the standpoint of comparative morphology and to a certain degree it seems to be so paleontologically. As might be expected this reduction is to some extent accompanied by a decrease in the power of flight. Dr. Calvert says, "Many of the ideas which have been expressed on the changes which have taken place in the venation of the Odonate wings have been based on the comparative morphology of living representatives of the order or on mechanical advantage. It does not follow that these foundations are trustworthy or that there has always been mechanical improvement in the wings. Degeneration is just as probable as progressive development. The actual course of phylogeny cannot be deduced from these considerations or from the data of morphology. It seems therefore desirable to attempt to ascertain what paleontological evidence exists affording clues to the descent of these insects, by tracing the modifications which the wings exhibit from the Carboniferous period down to the present time." This is what he has done and free use is here made of his conclusions.

It should be noted that the tendencies here discussed are not all present in the group, nor all to be found even in the highest groups, but they are those which impress one, when studying over all the groups, as being indicative of advancement and departure from the

generalized condition. They fall under two or three general heads and may be so treated in their discussion. First come those which may be classified under "Vein Reduction," secondly, those having to do with "Vein Shifting," and as a last group "Miscellaneous Features."

Vein Reduction

1. *Reduction in the number of supplementary sectors.*—This is one of the most evident means of specialization within any group which possesses such sectors, as well as in the whole suborder, of which the two highest subfamilies have none. A comparison of the different subfamilies in this regard may be made in a general way by choosing for each one as its most typical genus the one after which it is named. In Table I this has been done, the figures indicating the number of sectors between the veins listed at the top of the columns. The figures are for the front wings.

Table I

The Number of Supplementary Sectors present in the Subfamilies of Zygoptera

Subfamily	Genus and Species	M_1–M_{1a}	M_{1a}–M_2	M_2–R_S	R_S–M_3	M_3–M_4	M_4–Cu_1	Cu_1–Cu_2	Cu_2 Margin	Total
Polythorinae	*Polythore gigantea*	0	4	0	3	7	2	5	2	23
Agrioninae	*Agrion virgo*	7	2	2	7	8	8	3	8	45
Epallaginae	*Epallage fatima*	5	2	2	3	4	4	4	4	28
Disparocyphinae	*Disparocypha biedermanni*	2	2	2	2	0	0	0	0	8
Megapodagrioninae	*Megapodagrion erinys*	0	2	2	0	1	0	0	0	5
Lestinae	*Lestes rectangularis*	0	2	2	2	3	0	0	0	9
Lestoidinae	*Lestoidea conjuncta*	2	0	0	0	0	0	0	0	2
Pseudostigmatinae	*Pseudostigma aberrans*	2	1	1	1	1	1	0	1	8
Coenagrioninae	*Coenagrion puella*	0	0	0	0	0	0	0	0	0
Protoneurinae	*Protoneura capillaris*	0	0	0	0	0	0	0	0	0

It should be remembered of course that such a table is of value in a general way only, since there is great variation in some subfamilies. *Epiophlebia* is a member of a lower suborder, yet its supplementary sectors are not so numerous as those of many Zygoptera. *Thaumatoneura* (fig. 51) is placed in the Megapodagrioninae, but its many sectors indicate a primitive condition, or possibly they may represent a secondary acquirement. Nevertheless, this table shows that the highest subfamilies have the fewest sectors.

Dr. Calvert has shown that in a general way the reticulation of the oldest fossil order related to Odonata, the Protodonata, was rich in supplementary sectors. In Anisozygoptera some wings were richly veined, others less so. He concludes, that we have, therefore, "only the general tendency to guide us when we assume that reduction in density of venation means specialization."

2. *Reduction of the veins* Cu_2 *and* Cu_1.—This tendency appears in three widely removed groups; by it are derived *Disparocypha* (fig. 37) from the *Epallaginae*, *Lestoidea* (fig. 45) from the Lestinae, and the Protoneurinae from the Coenagrioninae. As was shown in the discussion of the Protoneurinae, Cu_1 follows Cu_2 in its reduction until nothing remains for both except the cross vein forming the lower part of the medio-anal link. This condition is the one to be found in *Selysioneura* (fig. 153) and is approached by a number of forms, such as *Nososticta* (fig. 151) and *Isosticta* (fig. 150).

3. *Decrease in the number of antenodal cross-veins.*—This very apparent tendency needs but little discussion, particularly after the thorough treatment given it by Campion (1913). The number of cross-veins in the lower Agrionidae is very high; in the higher Epallaginae it is reduced to seven, eight, and nine; in the Coenagrionidae, only *Thaumatoneura* (fig. 51) has over three. *Neurolestes* (fig. 62), *Trineuragrion* (fig. 54), and *Neuragrion* have three generally, in one wing at least; and *Chlorolestes* (fig. 66), *Podopteryx* (fig. 53), *Paraphlebia* (fig. 64), *Heteragrion* (fig. 68), and *Pyrrhosoma* (fig. 89) have occasionally been observed to have three; all others commonly two. Dr. Calvert cites evidence to show that this reduction is not in proportion with the retraction of the nodus, but is apparently an independent and recent acquisition.

4. *Decrease in the number of postnodals.*—In the Zygoptera this tendency comes in much later than does the reduction in the antenodal series, nor does it ever reach so advanced a state. It appears very marked in the Coenagrioninae only, and there in the *Argia* and *Coenagrion* series some of the highest genera such as *Diargia* (fig. 85), *Agriocnemis* (fig. 104), *Hemiphlebia* (fig. 106), and others have very few postnodals.

5. *Loss of the cross-veins in the quadrangle and subquadrangle.*—The number of cross-veins in and before the subquadrangle seems generally to correspond roughly to that of the antenodals. In those Agrionidae with numerous antenodals the subquadrangle is generally crossed and the number of "cubito-anal" cross-veins is so great that Ac itself is distinguished only with difficulty. *Neocharis* (fig. 31) offers an interesting exception; in it the antenodals of both series are numerous, but there are no true cross-veins back of Cu. *Diphlebia* (fig. 34) and *Amphipteryx* (fig. 35) may also have none. In the Coenagrionidae the lack of cross-veins in the subquadrangle has become the normal state and it is only in such forms as *Paraphlebia* (fig. 64) and *Dimeragrion* (fig. 67) that any are found. The same tendency is true of the cross-veins of the quadrangle; they are first lost in the Epallaginae and in the higher forms are normally retained by one genus only, *Anomisma* (fig. 48).

6. *Reduction in number of those antenodal cells situated between M_4 and Cu_1.*—As shown by Dr. Calvert "this character is in general dependent on the degree of retraction of the nodus," and, "a reduction in the number of antenodal cells may occur independently of retraction of the nodus, however, by the greater development of the quadrilateral distad." It is evident also that this reduction is a part of the general tendency toward a smaller number of cross-veins in the wing as a whole; almost any part of which when observed through a long ascending series, will show the cross-veins becoming placed further apart. Other examples of the tendency might be noted, for instance, the freeing of the basal radial space where the latter exists.

7. *Reduction in the number of cross-veins behind the anal vein.*—In part this is in line with the general tendency to drop out cross-veins; in part due to progressive petiolation which reduces the

amount of space back of the anal bridge and therefore the possibility of cross-veins occurring there.

Vein Shifting

1. *Narrowing of the wing.*—This tendency is coupled with the first one mentioned in the previous group, namely the reduction in the number of sectors. When the sectors drop out, the principal veins come to lie closer together. The wing may become narrower also by the veins Cu_1 and Cu_2 becoming reduced. A comparison of the typical genera of the subfamilies shows at a glance how prevalent this tendency is (see Table II).

Table II

The Ratio of the Width of the Wing to the Length in the Different Subfamilies.

Subfamily	Typical genus and species	Ratio, as Decimal
Polythorinae	*Polythore gigantea*	.380
Agrioninae	*Agrion maculatum*	.345
Epallaginae	*Epallage fatima*	.228
Disparocyphinae	*Diparocypha biedermanni*	.167
Megapodagrioninae	*Megapodagrion erinys*	.201
Lestinae	*Lestes rectangularis*	.203
Lestoidinae	*Lestoidea conjuncta*	.252
Pseudostigmatinae	*Pseudostigma, sp ?*	.195
Coenagrioninae	*Coenagrion resolutum*	.210
Protoneurinae	*Protoneura capillaris*	.152

It is evident in this table, what effect the dropping out of Cu_2 in *Disparocypha* and *Protoneura* has on the width of the wing. In *Lestoidea*, however, the presence of two sectors between M_1 and M_{1a}, has offset this tendency (see fig. 45).

The Pseudostigmatinae is a good example of the same tendency (see Table III). The subfamilies Megapodagrioninae, Coenagrioninae, and Epallaginae might be used for similar tables.

An examination of Handlirsch's figures in "Die Fossilen Insecten" show some rather narrow wings in periods as remote as the Mesozoic; evidently narrowing of the wing and loss of the sectors are ancient tendencies.

Table III

The Ratio of the Width of the Wing to the Length, in the Pseudostigmatinae.

Genus and Typical Species	Ratio, as Decimal
Megaloprepus coeruleatus	.267
Microstigma exustum	.237
Anomisma abnorme	.204
Pseudostigma aberrans	.177
Mecistogaster marchali	.148

2. *Progressive petiolation.*—In each subfamily except the Agrioninae, where specialization is along a different direction, there is a very noticeable tendency toward greater petiolation; it has been referred to constantly in the discussion on phylogeny and is used often in the keys, offering as it does an easy index to the amount of departure from the primitive. The Protoneurinae might be considered an exception, since in them, A becomes shorter and the reduction process is a matter of retraction. But in both cases the result is the narrowing of the wing near the base. Dr. Calvert discusses petiolation from the paleontological standpoint and says, "It seems justifiable to assume that the farther distad petiolation has progressed, the more specialized the insect."

Petiolation reaches its highest development in the Megapodagrioninae where in *Chorismagrion* (fig. 69) and *Perilestes* (fig. 70) it extends to beyond the level of MA.

3. *Retraction of the nodus toward the wing base.*—This is one of the most common and evident occurrences in specialization and is discussed in detail by both Professors Needham and Calvert. In the Agrionidae the nodus is almost universally at more than one-third the distance from the base of the wing toward the tip, in the Coenagrionidae at generally less.

4. *Tendency for M_2, R_{4+5}, and M_3 to arise nearer the tip of the wing and further from the subnodus.*—As Dr. Calvert remarks this outward "migration may be real or apparent. Retraction of the nodus with no change in position of the separation point of M_2 would result in a greater interval between nodus and M_2 and hence an apparent movement of the latter toward the stigma, but no real movement in respect to the wing as a whole." His table for

various members of the Megapodagrioninae shows it is often apparent only; but even if so a combination of the preceding tendency and of this one indicates specialization.

A study of almost any group will show the same thing; one that is a good example is the *Platycnemis* group of the Coenagrioninae (see Table IV).

Table IV

The Ratio to the Length of the Wing of the Distance from the Base of the Wing to the Subnodus and Points of Origin of M_2, R_s, and M_3.

Genus and Species	Subnodus	M_2	R_s	M_3
Metacnemis valida	.381	.619	.381	.362
Calicnemis eximia	.309	.576	.309	.289
Psilocnemis marginipes	.354	.631	.354	.339
Platycnemis pennipes	.354	.562	.354	.323
Allocnemis leucosticta	.345	.582	.345	.322
Coeliccia membranipes	.311	.613	.311	.301
Tatocnemis malgassica	.311	.561	.327	.311
Prionocnemis haematopus	.191	.591	.435	.209

A first glance at the wings themselves might suggest to one that M_2, R_s, and M_3 arise further out in the wing in the last genera than in the first, but an inspection of the above table shows that in general this is not true. It is not even equally true of the different veins but may be more so of some than others; R_s for example in *Prionocnemis* (fig. 79) does arise beyond what it does in the others, M_2 and M_3 really arise nearer the base in the more specialized than in the lower wings. The subnodus becomes more retracted, quite consistently so, and the space between it and the points of origin of M_2 and R_s enlarges, while the relative positions of the subnodus and the base of M_3 change.

A comparison of the Agrionidae and of the Coenagrionidae shows on the whole, that in the lower subfamilies of the latter family the vein M_{1+2} forks at about one-half the wing-length, as it does in the former family, but in the higher subfamilies the movement outward is evident. In the whole series R_s and M_3 also migrate outward. Dr. Calvert says that "the paleontological evidence is not altogether satisfactory and at least admits of the possibility of the separation—points of these three veins having fluctuated proximad or distad from time to time."

5. *Migration outward of the base of* M_{1a}.—This tendency is correlated somewhat with the preceding, but seems to be independent of it to a certain degree. Most genera among the Agrionidae, Pseudostigmatinae, Lestinae, and Megapodagrioninae have M_{1a} arising about three or four cells beyond the fork of M_{1+2}, or at least rather near it. *Perilestes*, (fig. 70) however, which has M_{1+2} forking about two-thirds of the way out has M_{1a} arising below the outer end of the stigma, or about one-fourth of the wing-length beyond M_2. This is true to a lesser degree in some of the Coenagrioninae such as *Platycnemis* (fig. 74), *Antiagrion* (fig. 81), *Hyponeura* (fig. 82), *Agriocnemis* (fig. 104), *Ceriagrion* (fig. 117) and others. It is not on the whole an important character, but does occasionally seem worthy of notice.

6. *The position of the second antenodals before the arculus.*—In those Agrionidae with many antenodals, there is a tendency for two of the costal antenodals to become more strongly developed than the others, and to be in line with two corresponding ones of the subcostal series, while at the same time the second of these pairs is directly above the arculus. In *Epiophlebia* (fig. 1) this second pair lies considerably beyond the level of the arculus; in *Polythore* (fig. 2) and *Euthore* (fig. 3) it is at that level, in *Cora* (fig. 5) and *Chalcopteryx* (fig. 4) before it. In the Agrioninae, i.e. the legion *Calopteryx*, there is no evident hypertrophy of antenodals, but in the Epallaginae the tendency is again evident and the number of antenodals is reduced, until the two pair typical of the Coenagrionidae remain. Here, as in the Polythorinae and some Epallaginae, in some of the most highly developed forms: *Lestoidea* (fig. 45), *Perilestes* (fig. 70), *Chorismagrion* (fig. 69), *Ceratura* (fig. 102), *Agriocnemis* (fig. 104), *Hemiphlebia* (fig. 106), *Caconeura* (fig. 143), *Protoneura* (fig. 146), *Selysioneura* (fig. 153) and others, the second antenodals are distinctly before the level of the arculus. Since this tendency rarely is manifest except in the highest members of the respective groups, it seems indicative of specialization.

7. *The tendency for the quadrangle to become acute distally.*—Dr. Needham (1903a) has taken as the primitive type of quadrangle one square distally and Mr. Williamson (1913) agrees that "in the relations of MA," the Calopteryginae (Agrionidae of this paper)

shows a generalized structure and adds that for the Agrioninae (Coenagrionidae here) he believes in two lines of evolutionary activity, one in which MA is the center of activity and the quadrangle becomes pointed; the other in which MA is not changed, but the posterior area of the wing is reduced; here he refers of course to the Protoneurinae. Dr. Calvert (1913) disagrees with the views above expressed, partly because he finds no paleontological evidence for their support. He argues that since "all the Jurassic fossils, which are not clearly Anisoptera, show an oblique quadrilateral with its posterior distal angle acute," it seems "necessary to regard the oblique quadrilateral as the more primitive and the rectangular as a later appearance." It is true that the Anisozygoptera figured by Handlirsch have a quadrangle which is somewhat acute distally, and that the only living representative of this suborder, *Epiophlebia*, (fig. 10) has an acute quadrangle, so that this condition seems the more ancient. When the living Zygoptera are taken up, however, those that are in other respects the most primitive have the quadrangle regular; in the Agrionidae, it is only in the higher Epallaginae that the obliquity becomes noticeable; and in the higher Megapodagrioninae, Lestinae, Pseudostigmatinae, and those Coenagrioninae of the *Argia* and *Coenagrion* groups it is carried to its highest development. Comparative morphology, therefore, brings evidence to show that the obliquity of the distal end of the quadrangle is not a direct heritage from the Anisozygoptera, but rather by a parallelism or independent development, and in general is a sign of specialization.

I think that enough evidence has now accumulated to show that this obliquity may in turn, grow less and the quadrangle be restored to distal squareness. In other words, the quadrangle is not as fixed and unchangeable a part of the wing as might at first be supposed. How else can the same shape of the quadrangle be explained in three widely separate groups which agree only in the reduction of Cu_2? I refer to *Disparocypha* (fig. 37), *Lestoidea* (fig. 45), and the Protoneurinae. Evidently when this reduction takes place new demands for bracing must be met and the quadrangle again becomes square. The squareness of the quadrangle, then, in the lower Agrionidae and in the Protoneurinae, is no proof of a

primitive or of a specialized state in both groups, but of one in the first, and of the other in the second.

8. *Change in length of the quadrangle.*—At first thought the elongation of the quadrangle seems to be a tendency which may point to departure from the ancient condition and which occurs rather often. Further investigation, however, fails to permit of the selection of any very well marked series in which this can be traced. Apparent elongation may be due to narrowing of the quadrangle itself or retraction of the nodus so that the quadrangle almost reaches its level. Beginning with *Climacobasis* (fig. 6) and *Echo* (fig. 7) and proceeding to *Psolodesmus* (fig. 16), one can observe some elongation, and likewise with *Pseudophaea* (fig. 21), *Dysphaea* (fig. 22), *Anisopleura* (fig. 25) and *Rhinocypha* (fig. 26), and in some Megapodagrioninae the tendency is similar. But for the whole suborder it has perhaps been rather different; the highest Coenagrionidae have almost as short a quadrangle as *Pseudophaea* (fig. 21), in fact often they may seem to have a smaller one, partly because of distal obliquity and the resulting shortness of the upper side. The length of the quadrangle, then, does not greatly change, except in short series.

9. *Attachment of supplementary sectors.*—Here again is a tendency not at all universal in its appearance, but occuring often enough to deserve mention. Among the *Polythorinae* it is evident in *Chalcopteryx* (fig. 4); among the Agrioninae it begins in *Neurobasis* (fig. 14) and *Phaon* (fig. 17) and ends in *Vestalis* (fig 18); in the Coenagrionidae, *Thaumatoneura* (fig. 51) exhibits it to a certain degree, *Megaloprepus* (fig. 46), *Microstigma* (fig. 47) and *Anomisma* (fig. 48) to a higher one, but since in *Pseudostigma* (fig. 49) and *Mecistogaster* (fig. 50) almost all secondary sectors drop out, the tendency cannot longer manifest itself; nor can it in the Coenagrioninae.

10. *Straightening of the longitudinal veins.*—Wherever there are many supplementary sectors present, the principal veins tend to curve, especially near the margin of the wing. But when these sectors drop out the veins themselves become straight and scarcely curve. Among the Agrionidae, this is true of *Micromerus* (fig. 28) and *Philoganga;* among the Coenagrionidae of *Lestes* (fig. 44),

Mecistogaster (fig. 50), the higher Megapodagrioninae, and the Coenagrioninae and Protoneurinae generally. I think fossil evidence bears out this tendency equally well; it is, as was said above, apparently one dependent on reduction in the number of sectors.

11. *Matching up of the cross-veins in transverse series.*—At the same time that the preceding tendency becomes evident and, largely in the same forms, it is very noticeable that the cross-veins become matched up and form regular transverse series across the wing. These are beautifully illustrated in the higher Pseudostigmatinae, the Coenagrioninae and the Protoneurinae above all others.

Miscellaneous Features

1. *Differentiation of fore and hind wings.*—This tendency so important among the Anisoptera has practically no place among the Zygoptera. A marked difference in size and shape is noticeable in only very few cases: *Chalcopteryx* (fig. 4) among the Polythorinae, *Pseudolestes* (fig. 38) among the Lestinae, and sometimes *Mecistogaster* (fig. 50) among the Pseudostigmatinae. These cases are certainly evidence of a departure from the primitive condition.

Many Zygoptera have a fairly constant difference in the length of the quadrangles of the fore and hind wings, enough so that one can tell which is the front and which the hind wing. The Polythorinae have this difference well developed in that the quadrangle of the fore wing is much the shorter and with fewer cross-veins. Among the Coenagrionidae several subfamilies have the upper side of the quadrangle of the fore wing shorter than that of the hind wing. But, generally speaking, the differentiation of fore and hind wings among the Zygoptera is not of enough importance for it to be considered a sign of specialization.

2. *The bracing of the stigma.*—Dr. Needham has shown two ways by which this may proceed, one by the cross-vein between R_1 and M_1 below the inner end of the stigma becoming oblique and often hypertrophied. This sort of bracing is not met with in the Agrionidae, nor in the lower Lestinae nor Megapodagrioninae. In most higher Lestinae, Megapodagrioninae, Coenagrioninae, and Protoneurinae it is the usual thing. The plates in Handlirsch's "Die fossilen Insecten" show bracing in *Tarsophlebia*, a genus

of the Anisozygoptera and among the possible ancestors of the Zygoptera.

The other method of bracing is for the inner end of the stigma to be pointed and form a Y, the base of which is made by that portion of R_1 situated just before it. In this way R_1 holds the stigma firmly. Both methods may occur in the same wing. The Polythorinae have this Y well developed.

3. *Atrophy of the stigma.*—The diffusion and even total disappearance of the stigma in genera of two subfamilies, the Agrioninae and Pseudostigmatinae, may not be considered by some as a sign of advancement, but since the Odonata as far back as the Mesozoic do have the stigma, and since the modern genera which stand at the base of the Agrionine and Pseudostigmatine lines have it, and its gradual disappearance is traceable in a series, its atrophy must be taken as a matter of specialization, if not necessarily one of advantage.

IV—SUMMARY

From the preceding discussion it is evident that venation gives in most cases an easy and fairly clear means of determining relationships, but in certain ones it may be capable of more than one method of interpretation, and must therefore be checked up by other characters if a final decision is to be reached. Sometimes this doubtful condition is due to parallelism, sometimes to contradictory evidence from several sources; one character in the wing may indicate one tendency, another quite a different one.

The keynote to the phylogeny of the Zygoptera as based on venation is reduction. With this in mind one can divide the suborder into two families, the lower of which, the Agrionidae, has as lateral offshoots: (1) the Polythorinae (figs. 2–5) in which M_4 does not descend the arculus and the quadrangle is therefore broad at the base and concave above; (2) the Agrioninae (figs. 6–20), where the wing fails to become petiolated, but the stigma atrophies and the quadrangle becomes somewhat convex above and widened distally; and (3) at a much higher level, the Disparocyphinae (fig. 37) as a direct offshoot of the main line of descent, by a shortening of Cu_2, until it is represented by a cross-vein only. This main line of descent is to be found in the Epallaginae (figs. 21–36) which

advance by petiolation, by reduction of the number of cross-veins, especially of the antenodals, and by a retraction of the nodus toward the wing-base. The Epallaginae lead to the second family, the Coenagrionidae, with which they are connected by various intermediate forms: *Diphlebia* (fig. 34), *Philoganga* (fig. 36), *Thaumatoneura* (fig. 51), *Ortholestes* (fig. 39) and *Pentaphlebia*. Early in the Coenagrionidae the nodus becomes more retracted, the number of antenodals becomes established as two, and the number of supplementary sectors shows a decided tendency to be decreased. There are two general lines of descent as regards the points of origin of R_s and M_3; in the first one these veins retain the condition of the Agrionidae and arise nearer the arculus than the subnodus; this is true of the Lestinae (fig. 38–44) and Lestoidinae (fig. 45). In the Lestinae is developed a quadrangle which is acute distally, and in the other subfamily the vein Cu_2 is again reduced so that it does not extend beyond MA. The other line in the Coenagrionidae has R_s and M_3 migrate outward so that they arise nearer the subnodus than the arculus. The Pseudostigmatinae (figs. 46–50) are an immediate offshoot, with greatly elongated wings in which the nodus is retracted and the stigma becomes diffuse. The Megapodagrioninae (figs. 51–70) form the central branch which leads to the Coenagrioninae (figs. 71–129) by the loss of all sectors except M_{1a}, and also continues in its own direction by greater petiolation and outward progression of the base of M_3. The Coenagrioninae are also characterized by a slight movement outward of M_3 and by a great reduction in the number of postnodals; petiolation on the whole does not proceed very far. This family in turn gives rise to the Protoneurinae (figs. 130–153) by the reduction of Cu_2, a change which has thus taken place in three groups of Zygoptera. In the Protoneurinae Cu_1 also becomes short, and in the highest form, *Selysioneura* (fig. 153), Cu does not branch at all.

V—KEYS FOR THE DETERMINATION OF GENERA

For the most part these keys indicate as nearly as they can be made to do so, the same views regarding the phylogeny of the Zygoptera as have been expressed in the preceding pages. The Coenagrioninae have been the stumbling block for such a system,

and although an arrangement can be made which seems to follow the general line of descent in this subfamily, and to indicate what tendencies have been followed out venationally, it has been so far impossible to base any key on venation, since the genera as now recognized have considerable variation within themselves. It has been necessary, therefore, to make use of structural characters for this subfamily, and to make a key for which no claims of natural relationship can be made, but which is merely an attempt to aid in identification. Before this difficult group can be finally worked out, however, much more material must be studied than it has been possible to study for this paper.

The nomenclature of veins used in the keys is the same as that shown in the wings of *Agrion* and *Argiocnemis* in the first part of the paper. The number of the figure appearing in connection with each genus refers to the plates at the end of the paper. For the following genera neither figures nor specimens have been available: *Paraphaea*, *Caliphaea*, and *Pentaphlebia* among the Agrionidae; and *Orolestes*, *Platylestes*, *Protolestes*, *Mesopodagrion*, *Metagrion*, *Allolestes*, *Argiagrion*, *Heteropodagrion*, *Mesagrion*, *Mesocnemis*, *Mombagrion*, *Myagrion*, *Nesocnemis*, *Nesobasis*, *Neuragrion*, *Onychargia*, *Paracnemis*, *Pericnemis*, *Phasmoneura*, *Stenocnemis*, and *Thermagrion* among the Coenagrionidae.

The material used for study of the other genera was that in the collections at Cornell University, at the Academy of Natural Sciences at Philadelphia, at the National Museum, in the private collection of Mr. C. H. Kennedy, and some borrowed from Mr. E. B. Williamson, the Carnegie Museum, and the Museum of Comparative Zoology. In addition to this free use was made of those figures and keys which appear in the literature, and of some photographs sent by Mr. H. Campion of the British Museum.

Key to the Suborders of Odonata

1 (4). Fore and hind wings essentially similar; in repose, held vertically or half-opened; eyes far apart. A quadrangle present. Males with two superior and two inferior abdominal appendages.....2

2 (3). Area between M_4 and Cu_1 just beyond MA as broad as that between Cu_1 and posterior margin of the wing. Quadrangle of hind wing and that of fore wing quite different in shape, the former twice as wide distally as proximally. Sectors of the wing (except M_{1a}) zigzag.....**ANISOZYGOPTERA** (p. 40)

3 (2). Area between M_4 and Cu_1 just beyond MA generally narrower than that between Cu_1 and the posterior margin of the wing. The quadrangle of the fore wing of the same general shape as that of the hind wing; one may be longer than the other, but if one is widened distally, both are. Sectors of the wing tend usually to be continuous veins, not broken nor zigzag.

ZYGOPTERA (p. 40)

4 (1). Fore and hind wings dissimilar, held horizontally in repose. Eyes close together. Supertriangle and triangle present. Males with two superior and one inferior abdominal appendage.....**ANISOPTERA**[5]

Key to the Suborder Anisozygoptera

Family *Epiophlebiidae*. Subfamily *Epiophlebiinae*.

1. But one living genus. Characters those of the suborder. Japan and Eastern Asia. (Fig. 1).....**Epiophlebia** Calvert, 1903
(*Palaeophlebia* Selys, 1899)

Key to the Families and Subfamilies of the Suborder Zygoptera

1 (8). Antenodal cross-veins 5 or more. Usually cross-veins present in the subquadrangle beyond the vein Ac. M_3 separating from M_{1+2} nearer to the arculus than to the subnodus. Nodus usually more than one-third of the distance from the base of the wing to the tip. The quadrangle often crossed.
(Family **Agrionidae**).....2

2 (3). M not descending the arculus; quadrangle therefore concave anteriorly and at least twice as wide proximally as distally. Basal space crossed. Wings petioled at least one-half way to the arculus. M_{1a} closely parallel to M_1.

Polythorinae (p. 42)

3 (2). M descending the arculus for some distance; the quadrangle not markedly concave anteriorly, and not twice as wide proximally as distally, at least in the hind wing. Basal space crossed or not. Wings petioled or not.....4

4 (5). M_{1a} parallel to M_2. Stigma often atrophied. Quadrangle elongate, often as long as the basal space, and convex anteriorly. Cu_2 beyond the quadrangle, especially in the hind wing, sends off a branch (Cu_{2a}) to support the area posterior to it, or Cu_2 itself bends back to support this area.....**Agrioninae** (p. 42)

5 (4). M_{1a} not parallel to M_2, but more or less intermediate between M_1 and M_2 (not in *Micromerus*) and with rather prominent sectors on either side. Stigma well developed, at least in the hind wing. Quadrangle not so long as the basal space, or if so, not generally convex anteriorly. Cu_{2a} not present.....6

6 (7). Cu_1 and Cu_2 well developed veins, A extending as far as the distal end of the quadrangle. M_4 generally somewhat curved beyond MA. Stigma usually not much broader distally than proximally.....**Epallaginae** (p. 45)

7 (6). Cu_1 short, not reaching the level of the subnodus. Cu_2 reduced to a cross-vein. A following the hind margin of the wing beyond Ac for some distance, then bending forward and ending at the posterior side of the quadrangle. M_4 not curved beyond MA. Stigma much broader distally than proximally.

Disparocyphinae (p. 47)

[5] Not further discussed in this paper.

8 (1). Antenodals generally two, rarely three to five. Usually no cross-veins in the subquadrangle beyond Ac. M_3 separating from M_{1+2} nearer the subnodus than the arculus, except in the *Lestinae*, none of which have more than two antenodals. Nodus usually from one-fifth to one-third of the distance from the base of the wing to the tip. The quadrangle crossed in *Anomisma* only.
(Family **Coenagrionidae**) 9

9 (12). M_3 arising nearer the arculus than the subnodus. The base of R_s (properly, the base of the bridge to R_s) arising before the subnodus and generally as near the arculus as the subnodus 10

10 (11). Supplementary sectors present between R_s and M_3, and between M_3 and M_4. Cu_1 and Cu_2 well developed, extending considerably beyond the subnodus.
Lestinae (p. 48)

11 (10). No supplementary sectors between R_s and M_3, and between M_3 and M_4; two between M_1 and M_{1a}. Cu_1 one cell long and not reaching the subnodus. Cu_2 reduced to a cross-vein ..... **Lestoidinae** (p. 49)

12 (9). M_3 arising nearer the subnodus than the arculus (half-way in *Rhipidolestes*). The bridge to R_s short, arising at or beyond the subnodus (slightly before in *Rhipidolestes*) 13

13 (18). Cu_2 not reduced to a vein one cell long nor lacking 14

14 (15). Stigma diffused or lost, not made up of one cell, but if present, usually of several cells, and irregular in shape, not braced. The longest vein between M_1 and M_2 rather more parallel to M_2 than to M_1. Nodus at from one-fourth to one-seventh the wing length. Many postnodal cross-veins.
Pseudostigmatinae (p. 49)

15 (14). A true stigma present, usually braced at the inner end. M_{1a} not usually parallel to M_2, when any other sectors are present. Nodus generally at more than one-fourth of the wing length. The number of postnodal cross-veins often reduced 16

16 (17). Definite supplementary sectors present other than M_{1a} and arising at least as far in the wing as under the stigma. (No such sectors in *Chorismagrion* or *Perilestes*, but these genera can be recognized by the petiolation of the wing which extends almost to the level of MA, by the quadrangle coming near to the posterior wing-margin, by the arching of Cu_1 beyond MA, and by R_s arising several cells beyond the subnodus.) The stigma generally rather heavy.
Megapodagrioninae (p. 50)

17 (16). No definite supplementary sectors other than M_{1a} are present, except occasional very irregular ones which are only a few cells long and do not arise more than a few cells from the wing-margin. Stigma generally rather small.
Coenagrioninae (p. 53)

18 (13). Cu_2 reduced to a cross-vein, ending in the margin of the wing, or in two genera to a vein one cell long ..... **Protoneurinae** (p. 63)

Key to the Genera of the Subfamily Polythorinae

1 (8). Cu_2 branched, more than one row of cells between Cu_1 and Cu_2 and between Cu_2 and the wing-margin 2

2 (7). Quadrangle of hind-wing one and one-half to two times as long as that of the fore-wing. Wings petioled about one-half of the way to the arculus. Fore-wing about three and one-half times as long as broad. Cu_2 forking, with two rows of cells between the branches. Arculus at slightly more than one-third of the distance from the base of the wing to the subnodus 3

3 (6). Fore and hind wings of same general shape and size. Sectors arising between the main veins, which do not appear forked. M_2 arising within a cell or two of the subnodus 4

4 (5). Venation very complex, many sectors and cross-veins; for example, 40–50 antenodals; often 12 or more cross-veins under the stigma; rather prominent sectors between M_4 and Cu_1, at least in the hind wing. In the hind wing, several sectors between M_2 and R_s arise as far proximad as the inner end of the stigma. Northern South America from Colombia to Peru and Brazil. (Fig. 2.)

Polythore[6] Calvert, 1917
(*Thore* Selys, 1853)

5 (4). Venation not so complex, antenodals 20 to 35; cross-veins under the stigma 6 to 10; usually no sectors between M_4 and Cu_1, more than three or four cells long. Between M_2 and R_s no sectors arise proximad of stigma. South America, Venezuela to Peru and Brazil. (Fig. 3.) ..... **Euthore** Selys, 1869

6 (3). Fore-wing evidently longer and narrower than the hind wing. Main veins appear forked because of the attached sectors. M_2 arising two to four cells beyond the subnodus, especially in the fore-wing. Brazil. (Fig. 4.)

Chalcopteryx Selys, 1853

7 (2). Quadrangle of hind wing scarcely longer than that of the fore wing. Wings petioled about two-thirds of the distance from the base of the wing to the arculus. Fore wing about four and one-half times as long as broad. Arculus often at almost one-half the distance from the wing-base to the subnodus. Mexico to Bolivia. (Fig. 5.) ..... **Cora** Selys, 1853

8 (1). Cu_2 unbranched, one row of cells between Cu_1, and Cu_2, one row of cells back of Cu_2 ..... **Miocora** Calvert, 1917

Key to the Genera of the Subfamily Agrioninae

1 (24). Cu_{2a} present. R_s in hind wing usually strongly waved 2

2 (19). Cu_{2a} running perpendicular to the posterior margin of the wing or toward the base of the wing, and usually with one or more sectors toward the anal angle which are longer than the quadrangle 3

3 (12). In the hind wing the sectors of that portion of the wing posterior to Cu_2 and distad to Cu_{2a} are generally arched from near the wing margin and not directly attached to Cu_{2a}. True stigma present 4

[6] Calvert, 1917, proposes the name *Polythore* for this genus, since the name *Thore* is preoccupied.

4 (9). Basal space crossed. Arculus usually distinctly angled and not markedly oblique.....5

5 (6). Eight or more cells across the anal area along Cu_{2a}. More than two sectors from Cu_{2a} run toward the anal angle, but they are irregular. Anal margin of hind wing convex. Space between Cu_1 and Cu_2 in hind wing reticulate just beyond MA. China. (Fig. 8.).....**Archineura** Kirby, 1894

6 (5). Not more than four to five cells along Cu_{2a} between Cu_2 and the wing-margin. In the fore wing there is one sector from Cu_{2a} toward the anal angle; anal margin not convex. One row of cells between Cu_1 and Cu_2 at their origin.....7

7 (8). Nodus less than one-half of the distance from the base of the wing to the stigma. Southern and south-eastern Asia. (Fig. 7.).....**Echo** Selys, 1853

8 (7). Nodus more than one-half the distance from the base of the wing to the stigma. Southeastern Asia. (Fig. 6.).....**Climacobasis**[7] Laidlaw, 1902

9 (4). Basal space free. Tendency for arculus to be less angled and more oblique.....10

10 (11). Cu_{2a} in the hind wing running almost toward the margin, so that it does not reach the length of the quadrangle before sending off a branch toward the anal angle. Western and Central Africa. (Fig. 9.).....**Umma** Kirby, 1890 (*Cleis* Selys, 1853)

11 (10). Cu_{2a} in the hind wing running toward the base of the wing, almost the length of the quadrangle before sending a branch toward the anal angle. West Africa. (Fig. 10).....**Sapho** Selys, 1853

12 (3). Sectors in that area of the hind wing posterior to Cu_2 and distad to Cu_{2a}, usually (sometimes not in *Agrion*) attached directly to Cu_{2a}. Stigma false or lacking.....13

13 (14). Basal space free. Almost cosmopolitan, except for most of Africa and Australia. (Fig. 11.).....**Agrion** Fabricius, 1775 (*Calopteryx* Leach, 1815)

14 (13). Basal space crossed.....15

15 (16). Broad area in hind wing posterior to Cu_2, with five rows of cells between end of Cu_{2a} and the wing margin which is very convex; in the hind wing the length is less than three and one-half times the breadth. R_s very strongly waved in the hind wing, cutting off a sector anterior to it. All four wings of the male opaque; only one or two cells of the basal space divided. Borneo. (Fig. 12.)

Matronoides Foerster, 1897

[7] I am not sure that *Climacobasis* is generically distinct from *Echo*. Laidlaw (1903) says of *Climacobasis lugens* and *Echo modesta*, "There can be no doubt that the two species which I founded on a single specimen in each case, are merely male and female of the same species. The generic name may be retained as that of a section of the genus *Echo*, distinguished by the great relative length of the pterostigma in the male, in which it is about three times as long as in the female." Williamson (1904) says, "*Echo* is known to me only from descriptions and figures, but such differences between it and *Climacobasis* appear to exist in the anal region and in the stigmas of the males that, in so far as the two names have been published, their separation seems to me desirable, at least till more critical study can be made."

Since I have had no access to specimens of *Echo*, I shall here follow the precedent made by Williamson. The stigmatic differences in figures six and seven are due to sex rather than genus.

16 (15). Area of hind wing posterior to Cu_2 narrower, with two to four rows of cells between end of Cu_{2a} and wing margin which is not very convex; hind wing about three and one-half times as long as broad. R_s not usually so strongly waved as to cut off an anterior sector.....17

17 (18). M_2 and M_3 not appearing forked. Most cells of basal space divided into two by median nervules. All four wings of male opaque. Cu_{2a} alike in fore and hind wings. Japan and southeastern Asia to India. (Fig. 13.)

Matrona Selys, 1883

18 (17). M_2 and M_3 appearing forked because of attached sectors. Only one or two cells of basal space divided. Front wings of male hyaline. Cu_{2a} in fore wing tends to parallel A. Malaysia. (Fig. 14.).....**Neurobasis** Selys, 1863

19 (2). Cu_{2a} turning away from the wing-base; the sector from Cu_{2a} toward the anal angle shorter than the quadrangle.....20

20 (23). True stigma present. M_{1+2} fusing with R at least in the hind wing. M_{1-3} and M_4 arise separately from arculus. Asian genera.....21

21 (22). Quadrangle approximately as long as the basal space and with four to seven cross-veins; posterior wing-margin near the anal angle not concave. Stigma about three times as long as broad; the distance from the wing-base to the nodus more than two-fifths of the wing length. Posterior end of the medio-anal link more basal than the anterior end. China and Japan. (Fig. 15)

Mnais Selys, 1853

22 (21). Quadrangle one and one-half times as long as the basal space and with ten or more cross-veins; posterior wing-margin near the anal angle very concave. Stigma four times as long as broad; the distance from the wing-base to the nodus less than two-fifths of the wing length. Posterior end of MA not so basal as anterior end. China and Formosa. (Fig. 16.)..**Psolodesmus** McLachlan, 1870

23 (20). Stigma present or not. M_{1+2} not fusing with R. M_{1-3} and M_4 usually arise at a common point, especially in the hind-wing. R_s in the hind wing waved so as to approach M_2 very closely. Africa and Madagascar. (Fig. 17)

Phaon Selys, 1853

24 (1). Cu_{2a} not present. Area posterior to Cu_2 supported by a wide bend of Cu_2. R_s in the hind wing not strongly waved. Quadrangle often very convex anteriorly and widened distally. Arculus not angled, but oblique.....25

25 (26). Basal space free. M_2, M_3, Cu_1, and Cu_2 with attached sectors. Veins and sectors turn sharply toward wing margin. Quadrangle almost as long as the basal space. India to Malaysia. (Fig. 18.).....**Vestalis** Selys, 1853

26 (25). Basal space crossed, distinctly longer than the quadrangle. Sectors intermediate, generally not attaching to the main veins. Veins and sectors not bending sharply toward the wing-margin. R_s and M_3 parallel at the end, with two intervening sectors. Genera of the Western Hemisphere, ranging from Canada to South America. (Figs. 19 and 20.)

Heterina[8] Selys, 1853, and **Lais** Selys, 1853

Key to the Genera of the Subfamily Epallaginae

1 (10). Wings petioled not more than one-half way from the wing base to the arculus. Quadrangle not more than four times as long as broad; with not more than two or three cross-veins. Area posterior to Cu_2, at its widest point, at least one-third the width of the wing at that point with several sectors beyond MA...2

2 (5). Quadrangle with one or two cross-veins; subquadrangle usually with more than two. In the hind wing the basal space generally not more than twice as long as the quadrangle.....3

3 (4). Area back of anal vein with only one row of cells to beyond MA, at least in the fore wing. Stigma with anterior proximal angle away from the wing-base. In the fore wing the antenodal cross-veins are less numerous than the postnodal. India to China and Malaysia. (Fig. 21.).....**Pseudophaea**[9] Kirby, 1890 (*Euphaea* Selys, 1840)

4 (3). Area back of anal vein with two rows of cells to beyond MA. Anterior proximal angle of stigma toward the wing-base. Antenodal cross-veins more numerous than the postnodal. Indo-China to Malaysia. (Fig. 22.)
Dysphaea Selys, 1853

5 (2). Quadrangle without cross-veins; subquadrangle usually with two or fewer. Basal space generally more than twice as long as the quadrangle 6

6 (7). Basal radial space closed and free. India. (Fig. 23.)
Bayadera Selys, 1853

7 (6). Basal radial space not closed in both wings.....8

[8] The genera *Heterina* and *Lais* now contain so many species with so many intergrading characters, that it is impossible to fix upon any clearly defined characters for the separation of the two genera, without a more detailed study than I have been able to give them. Many species of *Heterina* have several rows of cells back of the anal bridge in the forewings, while *Lais* is supposed to have but two such rows. However, in specimens of *H. donna*, *vulnerata*, *cruentata*, *tricolor*, *titia*, *caja*, *macropus*, etc. some have only two. In many species of *Hetaerina* the males have the base of the wing red. Beyond these characters further ones are unknown to me.

[9] The genus *Paraphaea*, Martin, 1903, would seem, from the description, in the Bulletin of the Museum of Paris 1903, to come in this part of the key, but the description is too incomplete to use for the key. The translation reads as follows: "This new genus is created from a single specimen from Manilla and belonging to the Museum of Paris. It is of the Legion *Euphaea* of M. de Selys. The basal space is free, the median sector (M_3) branches from the principal (M_1) toward the end of the quadrangle; the feet are quite long, the body slender, the fundamental color of the body red, but the ventral surface of the thorax entirely black. The nodus is placed exactly at the middle of the wing. The superior appendages are slightly bent not dilated, the inferior small; the posterior margin of the tenth segment bears a papilla."

Under the specific description of P. *barbata:* "Abdomen 55 mm.; lower wing 41 mm.; 24 antenodals and 24 postnodals to the upper wings; 24 antenodals and 24 postnodals to the lower wings. Wings hyaline, slightly tinged with saffranin, the distal tip of the stigma bordered with brown; the stigma brown, covering seven cells, broad at the middle, narrowed at the two ends which are pointed, especially proximally. Quadrangle small, short, crossed."

8 (9). Basal radial space crossed. M_2 usually arising not more than one cell from sub-nodus. The longest sector between Cu_1 and Cu_2 arising below a point several cells before the level of the subnodus. Greece to Persia. (Fig. 24.)
Epallage Charpentier, 1840

9 (8). Basal radial space free; M_2 tends to arise two cells beyond the subnodus. The longest sector between Cu_1 and Cu_2, especially in the hind-wing, arises almost below the subnodus. In the hind-wing of the male, C has a hump before the arculus. India to Burma. (Fig. 25.).....**Anisopleura** Selys, 1853

10 (1). Wing usually petioled two-thirds or more of the way to the arculus. Length of quadrangle and the number of cross-veins vary. The area posterior to Cu_2 narrow, at its widest point usually less than one-fourth the width of the wing at that point, and with not more than two distinct longitudinal sectors.....11

11 (16). Area posterior to Cu_2 a single row of cells (occasionally two cells wide for a short distance; but if so, Cu_2 is not arched). Quadrangle in the fore wing usually at least six times as long as wide. Beyond MA, M_4 arches forward, Cu_2 backward. M_2 and R_4 near the wing-margin generally are parallel and with two rather prominent parallel sectors between.....12

12 (13). Quadrangle generally with two or more cross-veins, at least in one wing. The sector anterior to M_{1a} arising before the inner end of the stigma, at least in the hind wing. India to Malaysia. (Fig. 26.)....**Rhinocypha** Selys, 1853

13 (12). Quadrangle usually with less than two cross-veins. The sector anterior to M_{1a}, if present, not arising before the inner end of the stigma.....14

14 (15). Short sectors between M_1 and M_{1a}. Third antenodal over arculus. Quadrangle uniform in width or widened distally. West Africa to Zanzibar and in Philippines. (Fig. 27.).....**Libellago** Selys, 1853

15 (14). No sectors between M_1 and M_{1a}. Second antenodal over arculus. Quadrangle wider proximally. India to Malaysia. (Fig. 28.)
Micromerus Rambur, 1842

16 (11). Area posterior to Cu_2 with more than one row of cells beyond MA, except in *Dicterias* and *Heliocharis*. (Of these two, *Heliocharis* often has basal space crossed; *Dicterias* has M_2 and R_4 ending very near to each other.) M_4 generally not prominently arched beyond MA.....17

17 (34). Quadrangle at least four times as long as wide. Wings generally widest beyond the level of the subnodus.....18

18 (27). Antenodal cross-veins usually more than twelve. Area posterior to Cu_2 of one row of cells only, sometimes two rows in *Neocharis;* or Cu_2 forks and has two rows of cells between the forks. Quadrangle crossed.....19

19 (20). Cu_2 forking; two rows of cells between the forks. First costal antenodal almost over the arculus. Brazil. (Fig. 29.)....**Cyanocharis** Needham, 1903

20 (19). Cu_2 not forking. First costal antenodal generally some distance before the arculus.....21

21 (22). Stigma covering only two to three cells. Supplementary sectors in apex of wing numerous and curved; some attached to the principal veins. Spines on the legs very long. India and China.....**Caliphaea**[10] Selys, 1859

[10] Same as *Notholestes*, McLachlan, 1887. See McLachlan, 1894, Annals and Magazine of Natural History, (6) 13: 435. I have seen neither figures nor specimens of this genus, but descriptions seem to place it in the *Epallaginae*.

22 (21). Stigma covering four to seven cells. Supplementary sectors not attached. Spines on legs medium in length. Genera of South America 23

23 (24). Basal space often crossed. Sectors between M_{1a} and M_2 do not arise before the level of the inner end of the stigma. M_{1+2} forks about two cells beyond the subnodus. Quadrangle with one cross-vein. Brazil. (Fig. 30.)
Heliocharis Selys, 1853

24 (23). Basal space free. M_2 arises within a cell of the subnodus. Quadrangle with one or two cross-veins 25

25 (26). Some sectors between M_{1a} and M_2 arise far before the level of the stigma. Quadrangle with one cross-vein. Brazil. (Fig. 32.) ..... **Dicterias** Selys, 1853

26 (25). No sectors between M_{1a} and M_2 arise before the level of the stigma. Quadrangle with two cross-veins. British Guiana. (Fig. 31.)
Neocharis Foerster, 1906

27 (18). Antenodal cross-veins usually less than nine. Area posterior to Cu_2 of more than one row of cells, but Cu_2 not symmetrically forked 28

28 (29). Two cross-veins in the quadrangle; two or three often in the subquadrangle. Stigma about three times as long as wide. Fourth antenodal over the arculus. M_2 arising four to five cells beyond the subnodus. Straits Settlements. (Fig. 33.) ..... **Devadatta** Kirby, 1890
(*Tetraneura* Selys, 1859)

29 (28). No cross-veins in the quadrangle; usually none in the subquadrangle. Stigma about five times as long as wide, fusiform in outline. Second or third antenodal over the arculus 30

30 (33). Genera of the Old World. M_2 not arising more than one cell beyond the subnodus. Sectors present between M_1 and M_{1a}. Second antenodal over the arculus 31

31 (32). M_2 arising at the subnodus, or within one-half cell of it; M_{1a} arising three to five cells beyond M_2. Arculus less than one-half way from the base of the wing to the nodus. Antenodals five to seven. Australia and Malaysia. (Fig. 34.) ..... **Diphlebia** Selys, 1869

32 (31). M_2 arising one cell beyond the subnodus, M_{1a} five cells beyond M_2. Arculus at one-half the distance from the base of the wing to the nodus. Antenodals generally five. West Africa ..... **Pentaphlebia**[11] Foerster, 1909

33 (30). A genus of the New World. M_2 arising two to four cells beyond the subnodus. Often no sectors between M_1 and M_{1a}. The third antenodal over the arculus. Colombia. (Fig. 35.) ..... **Amphipteryx** Selys, 1853

34 (17). Quadrangle about twice as long as wide. Wings widest before the level of the nodus. Antenodals about fifteen. India to China. (Fig. 36.)
Philoganga Selys, 1879

Key to the Disparocyphinae

1. One genus only, characters those of the subfamily. Antenodals ten to twelve in each series. South Celebes. (Fig. 37.) ..... **Disparocypha** Ris, 1916

[11] Only the description was available for this genus.

Key to the Genera of the Subfamily Lestinae

1 (2). The distal end of the quadrangle cut off almost squarely. The front wing over one-third longer than the hind wing. A short sector present in the fore wing between M_1 and M_{1a}. In the hind wing a sector present between M_4 and Cu_1. The distance between the points of origin of M_3 and the bridge to R_s is almost as long as that from the origin of M_3 to the arculus. Hainan. (Fig. 38.)
Pseudolestes Kirby, 1900

2 (1). The distal end of the quadrangle is not cut off squarely. The fore and hind wings of about the same length. No sector between M_1 and M_{1a} (except in *Ortholestes*). The distance between the origin of M_3 and that of the bridge to R_s is less than the distance from the origin of M_3 to the arculus. 3

3 (4). The quadrangle widened distally and with the superior side over one-half the length of the inferior. No sectors between M_3 and M_4. Two rows of cells between M_4 and Cu_1 at the end of Cu_1, at least in many specimens. West Indies. (Fig. 39.) . . . . . **Ortholestes** Calvert, 1891

4 (3). The quadrangle not widened distally and with the superior side scarcely one-half the length of the inferior. One or more sectors between M_3 and M_4, except in *Orolestes*. One row of cells between M_4 and Cu_1.

5 (6). The inner end of the quadrangle in the fore wing almost one-half the length of the lower side. M_{1+2} forking less than two cells beyond the subnodus. The third antenodal space almost twice the length of the first. California to Venezuela. (Fig. 40.) . . . . . **Archilestes** Selys, 1862

6 (5). The inner end of the quadrangle one-third or less of the length of the lower side except in *Orolestes*. M_{1+2} forking more than two cells beyond the subnodus, at least in one wing. The third antenodal space not more than one and one-half times the length of the first 7

7 (8). Wing petioled to within Ac's length of itself. No sectors between M_3 and R_s. The longest sector between M_2 and R_s arises about one-half of the way between the stigma and the origin of M_{1a}. M_{1a} not zigzag. India. (Fig. 41.)
Megalestes Selys, 1862

8 (7). Wing petioled to Ac or nearly so. Sectors present between M_3 and R_s. The longest sector between M_2 and R_s not arising more than three or four cells before the level of the stigma 9

9 (10). Wings, at least those of the male, with large opaque areas. Cu_2 is the only zigzag vein. Stigma very large, surmounting four to six cells. M_{1+2} forking five to seven cells beyond the subnodus. India . . . . **Orolestes**[12] McLachlan, 1895

10 (9). Wings hyaline. Many of the veins strongly zigzag; i. e. the cells are angled. Stigma shorter, surmounting two to three cells. M_{1+2} forks three to seven cells beyond the subnodus 11

11 (12). Stigma broad, scarcely two and one-half times as long as wide. R_s zigzag. The anal appendages of the female ovoid, very much depressed, as long as the tenth segment. A single species, from East Indies. . . **Platylestes**[12] Selys, 1862

[12] Descriptions only have been available for these genera.

12 (11). Stigma narrower, usually three or more times as long as wide 13

13 (14). Wings raised, when at rest. Inner end of quadrangle only one-fifth as long as the inferior side. The prothorax with three scallops posteriorly, the middle one of which is the longest. Europe to Madagascar, New Guinea, and New Caledonia. (Fig. 42.) . . . . . **Sympycna** Charpentier, 1840

14 (13). Wings held horizontally, when at rest. The prothorax not as above 15

15 (16). The sectors of the arculus arising toward the middle, M_4 about one-half of the way down; hence the quadrangle is narrow with the inner end between one-fourth and one-fifth as wide as the inferior side is long. The quadrangle in the hind wing has a distinctly longer upper side than does that of the fore wing. The upper and lower sides are almost parallel. A genus from Australia and surrounding islands. (Fig. 43.) . . . . . **Austrolestes** Tillyard, 1913

16 (15). The sectors of the arculus arising nearer its upper end, M_4 about one-third of the way down, hence the inner end of the quadrangle is from one-third to one-fourth of the length of the inferior side. The quadrangle of the front and hind wings essentially alike and triangular in shape because of the narrowing distally. Cosmopolitan, except not in Australia. (Fig. 44.)

Lestes Leach, 1815

Key to the Subfamily Lestoidinae

1. One genus only; the characters those of the subfamily. Australia. (Fig. 45.)

Lestoidea Tillyard, 1913

Key to the Genera of the Subfamily Pseudostigmatinae

1 (6). Secondary sectors numerous; two or more rows of cells between M_{1a} and M_2 for some distance. M_{1+2} forking at more than one-half of the distance from the subnodus to the tip of the wing. Cu_2 short, ending at the level of less than one-half the distance from the fork of M_{1+2} to the tip of the wing. Cu_2 with many forks; several to many cells between Cu_2 and the posterior wing margin 2

2 (5). Quadrangle not crossed; about five times as long as wide. No cross-vein in the subquadrangle. MA before the level of the subnodus. M_{1+2} forking beyond the half-way point between the subnodus and the tip of the wing 3

3 (4). The nodus at one-sixth of the wing length; M_2 arched forward under the stigma so as to make a sharp bend. M_3 forks under the inner end of the stigmatic area, at about fifteen cells from the margin of the wing; Cu_1 forks many cells from the wing-margin. Mexico to Guatemala. (Fig. 46.)

Megaloprepus Rambur, 1842

4 (3). The nodus at one-fifth of the wing length; M_2 not so strongly arched. M_3 forks about five cells from the wing margin or not at all. Cu_1 forks about five cells from the wing margin. Colombia to Brazil and Ecuador. (Fig. 47.)

Microstigma Rambur, 1842

5 (2). The quadrangle with two or three cross-veins, several in the subquadrangle, some of which line up with those in the quadrangle. MA in the hind-wing especially, is at the level of the subnodus. M_{1+2} forking at about half way between the subnodus and the wing tip. Peru and Ecuador. (Fig. 48.)

Anomisma McLachlan, 1877

6 (1). Secondary sectors few; a tendency to only one row of cells between M_{1a} and M_2, if two rows, it is for a short distance only, M_{1+2} forking at less than one-half the distance from the subnodus to the tip of the wing. Cu_2 longer, ending at one-half or more than one-half of the distance from the fork of M_{1+2} to the tip of the wing, at least in the fore wing. Cu_2 unbranched. One or two rows of cells between Cu_2 and the posterior wing margin. One row of cells between R_1 and M_{1+2} before the fork of the latter 7

7 (8). The nodus at one-fifth of the wing length. The hind wing, at least, tends to have two rows of cells between M_{1a} and M_2 for a short distance. M_4 has several short sectors at its end; there are two rows of cells posterior to Cu_2. Mexico to Colombia. (Fig. 49.) . . . . . **Pseudostigma** Selys, 1860

8 (7). The nodus at one-fourth to one-fifth of the wing length. One row of cells between M_{1a} and M_2. No sectors more than a few cells long, except between M_3 and M_{1a}. M_4 usually unbranched. One row of cells between Cu_2 and the posterior wing-margin. West Indies and Mexico to Ecuador. (Fig. 50).

Mecistogaster Rambur, 1842

Key to the Genera of the Subfamily Megapodagrioninae

1 (2). Antenodals three to five, postnodals over fifty; venation very complex, many supplementary sectors from M_1 to the posterior margin of the wing. About ten cross-veins under the stigma. Quadrangle almost rectangular at both ends. Wings not petioled to the level of the arculus. Panama to Costa Rica. (Fig. 51.)

Thaumatoneura McLachlan, 1897

2 (1). Antenodals two to three, postnodals generally not over thirty; venation simpler; supplementary sectors not usually present between M_1 and M_{1a}, and Cu_1 and Cu_2. Cross-veins under stigma six or fewer. Quadrangle generally acute distally. Wings usually petioled beyond the level of the arculus 3

3 (4). R_s arising one cell before the subnodus, M_3 about one-half the distance between the arculus and the subnodus. Supplementary sectors M_{1a} to Cu_2. Wing petioled to the level of one-third to one-half of the distance between the arculus and MA. Formosa. (Fig. 52.) . . . . . **Rhipidolestes** Ris, 1912

4 (3). R_s not arising before the subnodus. M_3 arising nearer the subnodus than the arculus 5

5 (30). R_s arising at or very near the subnodus, M_3 at least one cell before the subnodus 6

6 (7). Area posterior to Cu_2 with four or five rows of cells. Wing petioled to or beyond the level of the arculus. Supplementary sectors from M_{1a} to Cu_1 or Cu_2. Malaysia and Australia. (Fig. 53.) . . . . . **Podopteryx** Selys, 1871

7 (6). Area posterior to Cu_2 with one or two, rarely three rows of cells 8

8 (19). Wing not petioled to the level of the arculus, it may be almost so in ***Trineuragrion***, a genus with a third antenodal 9

9 (14). Short sectors present between R_s and M_3 as well as some of the other longitudinal veins 10

10 (11). One or two sectors between M_1 and M_{1a}; others from M_{1a} to M_3 and M_4 and Cu_1. Malaysia. (Fig. 55.)..... **Rhinagrion** Calvert, 1913 (*Amphilestes* Selys, 1862)

11 (10). No sectors between M_1 and M_{1a}..... 12

12 (13). Three antenodals, the third one being costal and beyond the arculus. One row of cells back of Cu_2. New Caledonia. (Fig. 54.).. **Trineuragrion** Ris, 1915

13 (12). Two antenodals. Generally at least two more or less complete rows of cells back of Cu_2. Australian region. (Fig. 56.)..... **Argiolestes** Selys, 1862

14 (9). No sectors between R_s and M_3..... 15

15 (16). A genus of the Old World. Three cells below the stigma, postnodals about twenty. Thibet?..... **Mesopodagrion**[13] McLachlan, 1896

16 (15). Genera of the New World. One cell below the stigma: postnodals about fifteen..... 17

17 (18). Three rows of cells in the area between M_{1a} and M_2, with two unbroken sectors between M_2 and R_s. In the male the stigma is two and one-half times as long as wide. Brazil. (Fig. 57.)..... **Megapodagrion** Selys, 1885, sens. strict.

18 (17). Two rows of cells in the area between M_{1a} and M_2 and one sector between M_2 and R_s. Stigma about twice as long as wide. Northern South America. (Fig. 58.)..... **Allopodagrion** Foerster, 1910

19 (8). At least one wing petioled to beyond the level of the arculus..... 20

20 (21). At least one sector between M_4 and Cu_1. Sectors present M_{1a} to Cu_1. Generally two or more rows of cells back of Cu_2, at least part way. Australian region. (Fig. 56.)..... **Argiolestes** Selys, 1862, sens. strict.

21 (20). No sectors between M_4 and Cu_1. One row of cells back of Cu_2..... 22

22 (29). Supplementary sectors between R_s and M_3 as well as M_{1a} to R_s and between M_3 and M_4. Cu_1 not strongly arched beyond MA..... 23

23 (24). The anterior of the sectors between R_s and M_3 shorter than the posterior one. Five cross-veins under the stigma. The longest sector between M_{1a} and M_2 arising four to six cells before the inner end of the stigma. Between M_3 and M_4 only one sector is more than three or four cells long. Costa Rica to Brazil. (Fig. 59.)..... **Philogenia** Selys, 1862

24 (23). The anterior of the sectors between R_s and M_3 is longer than the posterior one. Two or three cross-veins under the stigma. The longest sector between M_{1a} and M_2 arises not more than one or two cells before the inner end of the stigma. Between M_3 and M_4 are often two sectors more than three cells long, especially in the hind wing..... 25

25 (26). Wing not petioled beyond the arculus. At least three cells between MA and the level of the subnodus in the area between M_4 and Cu_1. Supplementary sectors (one or two each) from M_{1a} to M_4. Labuan and Sumatra. (Fig. 60.) **Podolestes** Selys, 1862

26 (25). Wing is petioled beyond the arculus. Two cells between MA and the level of the subnodus in the area between M_4 and Cu_1. Supplementary sectors (two each) from M_{1a} to M_4..... 27

[13] Description only was available for this genus.

27 (28). Wing petioled to the level of about one-third the length of the quadrangle. Three antenodals. Tendency to a cubito-anal cross-vein before the subquadrangle in addition to the vein Ac. Arculus not beyond the last antenodals. West Africa. (Fig. 62.) ..... **Neurolestes** Selys, 1882

28 (27). Wing petioled to the level of one-half to two-thirds of the length of the quadrangle. Two antenodals. No accessory cross-veins before the subquadrangle. Arculus distinctly beyond the second antenodals. Madagascar. (Fig. 61.)
Nesolestes Selys, 1891

29 (22). No sectors present between R_s and M_3. Cu_1 strongly arched beyond MA. One sector between M_{1a} and M_2 and one between M_2 and R_s. Australia. (Fig. 63.) ..... **Synlestes** Selys, 1869

30 (5). R_s arising at least a cell beyond the subnodus. M_3 usually not before the subnodus, at least not a cell's length before it. The wing petioled to beyond the level of the arculus 31

31 (32). Sectors M_1 to Cu_2. Many sectors between Cu_1 and Cu_2 so that the distance on the hind margin between these two veins is as great as that from the level of MA to the end of Cu_2. Quadrangle very long, almost or quite reaching the subnodus. Wing greatly petioled. Mexico to Central America. (Fig. 64.)
Paraphlebia Hagen, 1861

32 (31). No sectors between M_1 and M_{1a}. Cu_1 and Cu_2 usually ending near together at the wing-margin 33

33 (36). The area behind Cu_2 of two or three rows of cells. Supplementary sectors at least from M_{1a} to Cu_1 34

34 (35). M_3 arising at the subnodus. Ac is slightly beyond the level of the first antenodal. New Guinea. (Fig. 65.) ..... **Wahnesia** Foerster, 1900

35 (34). M_3 arising slightly beyond the subnodus, New Guinea.
Metagrion[14] Calvert, 1913

36 (33). The area posterior to Cu_2 of one row of cells only 37

37 (48). Supplementary sectors rather numerous. Some between R_s and M_3 38

38 (41). Supplementary sectors from M_{1a} to M_4. Old World genera 39

39 (40). M_3 arising from M_{1+2} at the subnodus. Often more than two sectors between M_{1a} and M_2. Quadrangle not reaching the level of the nodus. South Africa. (Fig. 66.) ..... **Chlorolestes** Selys, 1862

40 (39). M_3 arising before the subnodus. Not more than two sectors between M_{1a} and M_2. Quadrangle long, reaching the level of the nodus. Seychelles.
Allolestes[14] Selys, 1869

41 (38). No sectors between M_3 and M_4. Genera of South America 42

42 (43). Antenodals more than two, at least in the hind wings. Ecuador.
Neuragrion[14] Karsch, 1891

43 (42). Antenodals two only 44

44 (47). M_3 separating from M_{1+2} before the subnodus 45

45 (46). Supplementary sectors from M_{1a} to M_3, often none between M_2 and R_s. Usually an accessory cross-vein between Cu and A. Guiana. (Fig. 67.)
Dimeragrion Calvert, 1913

[14] Descriptions only were available for these genera.

46 (45). Supplementary sectors between M_2 and R_s and two long ones between R_s and M_3. No cross-veins in the subquadrangle or before it. Ecuador.
Heteropodagrion[15] Selys, 1885

47 (44). M_3 separating from M_{1+2} beyond the subnodus. Supplementary sectors between M_{1a} and M_2, and R_s and M_3. Colombia.....**Mesagrion**[15] Selys, 1885

48 (37). No supplementary sectors between R_s and M_3.....49

49 (50). R_s arising one cell beyond the subnodus. Two sectors between M_{1a} and M_2, some also between M_2 and R_s, and M_3 and M_4. Cu_1 arched beyond MA. South Africa. (Fig. 66.).....**Chlorolestes** Selys, 1862

50 (49). R_s arising at least two or three cells beyond the subnodus. No sectors between M_2 and R_s nor between M_3 and M_4.....51

51 (54). At least some supplementary sectors present. Quadrangle not approaching very closely the posterior wing-margin. Cu_1 not strongly arched beyond MA.....52

52 (53). One sector between M_{1a} and M_2. Africa and Madagascar.
Protolestes[15] Foerster, 1899

53 (52). Two sectors between M_{1a} and M_2. The New World, from Mexico to Argentina. (Fig. 68.).....**Heteragrion** Selys 1862

54 (51). No supplementary sectors except M_{1a}. The quadrangle at its distal end approaches the hind margin of the wing. Cu_1 strongly arched beyond MA.....55

55 (56). The fore wing of the male with the inner end of the quadrangle lacking. Ac about one-third of the way from the first to the second antenodals. R_s arising four cells beyond the subnodus in the fore wing, three in the hind wing. The upper side of the quadrangle distinctly shorter than the lower side. Australia. (Fig. 69.).....**Chorismagrion** Morton, 1914

56 (55). The quadrangle touching the posterior wing-margin. The wing petioled to M_{1a}. M_3 arising one to one and one-half cells beyond the subnodus. R_s at five to seven cells beyond the subnodus. Costa Rica to Brazil. (Fig. 70.)
Perilestes Selys, 1862

Key to the Genera of the Subfamily Coenagrioninae

1 (22). Quadrangle relatively regular, the upper side two-thirds to three-fourths or more of the length of the lower in both wings. M_4 and Cu_2 scarcely zigzag, so that most of the cells of the wing are four-sided rather than five-sided; the longitudinal veins arranged in a parallel and very regular fashion. Tibial spines and quadrangle relatively long. (Legion *Platycnemis* of Selys for the most part).....2

2 (13). Wings generally plainly not petioled to Ac. R_s arising at the subnodus.....3

3 (6). The upper side of the quadrangle more than three-fourths the length of the lower side. Antenodal cells between M_4 and Cu_1 are three to five in number, usually at least four. Ac near the level of the first antenodal cross-veins. The first and second antennal segments short, the third long and slender.....4

4 (5). Three to five antenodal cells between M_4 and Cu_1. Arculus under the second antenodals. Africa. (Fig. 71.).....**Metacnemis** Selys, 1863

[15] Descriptions only were available for these genera.

5 (4). Four antenodal cells between M_4 and Cu_1. The arculus between the first and second antenodals, much before the second. West Africa.
Mesocnemis[16] Karsch, 1891

6 (3). The upper side of the quadrangle not more than three-fourths the length of the lower side; the antenodal cells three or less between M_4 and Cu_1. Ac generally beyond the level of the first antenodals. Antennae not as above except in *Platycnemis* and *Stenocnemis* 7

7 (10). Cu_2 long, extending beyond the level of the base of M_{1a} which is six to seven cells before the level of the stigma. Postnodals fifteen or more. Posterior tibiae of males not dilated, superior anal appendages at least as long as the inferior 8

8 (9). Three antenodal cells between M_4 and Cu_1. About fifteen postnodal cells in the front wing. The third segment of the antenna shorter than the first plus the second. Cu_2 long, extending beyond the level of the base of M_{1a}, which vein arises six to seven cells before the stigma. India to Burma. (Fig. 72.)
Calicnemis Selys, 1863

9 (8). Two antenodal cells between M_4 and Cu_1. Front wing with eighteen to twenty postnodals. The third segment of the antenna longer than the first plus the second. West Africa ..... **Stenocnemis**[17] Karsch, 1899

10 (7). Cu_2 not extending beyond the level of the base of M_{1a}, the latter arising two to four cells before the stigma. About thirteen postnodals. Two antenodal cells between M_4 and Cu_1. Posterior tibiae of males more or less dilated, superior anal appendages shorter than the inferior 11

11 (12). Cu_2 extending almost to the level of the base of M_{1a}. The second antennal segment as long as the third. Syria to Japan and Sumatra; Madagascar. (Fig. 73.) ..... **Copera** Kirby, 1890
(*Psilocnemis* Selys, 1863)

12 (11). Cu_2 not extending to the level of the base of M_{1a} by several cells. The third antennal segment as long as the first plus the second. Mediterranean Region and China. (Fig. 74.) ..... **Platycnemis** Charpentier, 1840

13 (2). Wings petioled close to or beyond Ac; R_s usually arising beyond the subnodus (sometimes at the subnodus in *Allocnemis*) 14

14 (21). R_s arising within one or two cells of the subnodus 15

15 (20). Wings not petioled to the level of the arculus. Ac almost as near the level of the second antenodal as of the first 16

16 (17). The end of the wing with a denticulate margin. Superior appendages of the male longer than the inferior, which are straight. Malaysia. (Fig. 75.)
Idiocnemis Selys, 1878

17 (16). The end of the wing not denticulate at the margin. Superior appendages not longer than the inferior 18

18 (19). The upper side of the quadrangle not more than three-fourths the length of the lower. Cu_2 extending beyond the subnodus to a distance of thirteen to sixteen cells. Usually six to nine cells between the base of R_s and the point where M_{1+2} forks. India to Malaysia. (Fig. 76.) ..... **Coeliccia** Kirby, 1894
(*Trichocnemis* Selys, 1857)

[16] Description only was available for this genus.

[17] Studied from descriptions only.

19 (18). The upper side of the quadrangle scarcely shorter than the lower. Cu_2 extending six to eight cells beyond the level of the subnodus. Four to five cells between the base of R_s and the forking of M_{1+2}. West Africa to South Africa. (Fig. 77.) ..... **Allocnemis** Selys, 1863

20 (15). Wings petioled beyond the level of the arculus. Ac under or near the level of the first antenodal. R_s arising one or two cells beyond the subnodus, M_3 at the subnodus. Madagascar. (Fig. 78.) { **Tatocnemis** Kirby, 1889 / **Nesocnemis**[18] Selys, 1891

21 (14). R_s arising four or more cells beyond the subnodus, at least in the front wing. Ac about one-half way between the antenodals. Philippines. (Fig. 79.) **Prionocnemis** Kirby, 1890 (*Hypocnemis* Selys, 1863)

22 (1). The quadrangle generally with a very acute distal lower angle, the upper side of the quadrangle usually less than two-thirds the length of the upper side. M_4 and Cu_1 usually zigzag, so that many cells are pentagonal. Wings generally not long nor with the straight appearance of those under rubric (1). (If the wings have the general appearance of those under (1), the quadrangle is acute at the end. If the quadrangle is regular, the postnodals are few in number and the second antenodals are before the arculus.) 23

23 (28). M_4 and Cu_1 not strongly zigzag, so that the principal veins are long, straight and give the wing the straight, uniform appearance of the *Platycnemis* group. Tibial spines relatively long 24

24 (27). In the front wing the inner end of the quadrangle is about as long as the upper side. M_{1+2} forks much nearer the origin of M_{1a} than the subnodus 25

25 (26). The upper side of the quadrangle about one-third as long as the lower side. The superior appendages of the male longer than the inferior, and compressed, and bent at the end. Seychelles. (Fig. 80.) **Leptocnemis** Kirby, 1890 (*Hemicnemis* Selys, 1882)

26 (25). The upper side of the quadrangle about one-half as long as the lower side. The superior appendages of the male thick, short, compressed, and conical in form. Madagascar ..... **Paracnemis**[19] Martin, 1903

27 (24). The inner end of the quadrangle of the fore wing about one-third the length of the upper side; the quadrangle long and narrow. M_{1+2} forking about one-half way between the subnodus and the base of M_{1a}. Chili. (Fig. 81.) **Antiagrion** Ris, 1904

28 (23). M_4 and Cu_1 zigzag; M_{1+2} usually curved somewhat at or beyond the subnodal region, instead of running straight out 29

29 (40). Tibial spines long, generally about twice as long as the intervening spaces. In the front wing the inner end of the quadrangle generally longer than the upper part of the arculus and as long as the upper side of the quadrangle. Quadrangle widened distally. Wing not petioled to the level of Ac 30

[18] De Selys' description of *Nesocnemis* fits that of *Tatocnemis* almost exactly; the two are evidently the same genus.

[19] Studied from the description only.

30 (31). Tarsal claws symmetrically cleft, so that the superior and inferior teeth are about equal. The ninth segment of the abdomen almost equals the eighth. The first segment of the antenna scarcely visible; superior male appendages as long as the inferior. Malaysia ..... **Onychargia** Selys, 1865

31 (30). Tarsal claws not symmetrically cleft, the superior and inferior teeth not equal 32

32 (33). The area posterior to Cu_2 tends to be two cells wide and the second antenodal is often slightly beyond the level of the arculus. M_4 becomes zigzag at the level of the fork of M_{1+2}. Mexico to Colombia. (Fig. 82.)

Hyponeura Selys, 1854

33 (32). The area back of Cu_2 of one row of cells only 34

34 (35). The prolongation of the nodal cross-vein through the vein M_{1+2} is generally at first perpendicular to M_{1+2}. M_{1+2} in the front wing forks six cells beyond the subnodus; in the hind wings four cells beyond. Tibial spines three times as long as the intervening spaces. New Guinea. (Fig. 83.) **Palaiargia** Foerster, 1903

35 (34). The prolongation of the nodal cross-vein through the vein M_{1+2} is not perpendicular to M_{1+2} 36

36 (37). Cu_2 long, extending to the level of the origin of M_{1a}, especially in the hind wing, and at least ten or twelve cells beyond the subnodus. Generally fourteen or more postnodal cells; three to seven antenodal cells between M_4 and Cu_1. The New World, Moluccas, Cape of Good Hope, Kurile Islands. (Fig. 84.)

Argia Rambur, 1842

37 (36). Cu_2 short, not extending more than four or five cells beyond the level of the subnodus. About ten cells present between the nodus and the stigma 38

38 (39). An apical spine on segment eight of the female. The arculus slightly beyond the second antenodal. Three antenodal cells between M_4 and Cu_1. West Indies and Central America. (Fig. 86.) ..... **Argiallagma** Selys, 1876

39 (38). No apical spine on segment eight of the female. The arculus at the second antenodal. Two antenodal cells between M_4 and Cu_1. Brazil. (Fig. 85.)

Diargia Calvert, 1909

40 (29). Tibial spines shorter, scarcely longer than the intervening spaces; if long, the wings are petioled to or beyond Ac. The inner end of the quadrangle usually not longer than the upper part of the arculus in the fore wing, nor longer than the upper side of the quadrangle. Quadrangle generally not widened distally 41

41 (88). No pale post-ocular spots present on a dark background 42

42 (53). Female with apical spine on segment eight[20] 43

(A) Wing petioled to the vein Ac. The quadrangle in the front wing with a very pointed distal lower angle, so that the upper side is shorter than or only as long as the inner end. Tenth segment of the abdomen with a deeply cut posterior margin. Considerable blue in the coloration. South America. (Fig. 121.)

Skiallagma Foerster, 1906

[20] The following two genera cannot be fitted into the key, because the females are unknown, but a brief description may aid in their determination.

(B) "Arculus at, or very near to, the second antenodal; M_2 on the hind wings arising nearest the fourth postnodal; costal edge of the stigma of the hing wings shorter than the proximal or distal edges; Cu_1 and Cu_2 not reaching as far distad as the level of origin of M_{1a} and M_2.....; A.....separating from the hind margin proximal to, or less frequently at, the cubito-anal cross-vein....., which is situated nearer the level of the first than of the second antenodal; venation of the tips of front and hind wings similar, abdomen chiefly red, tenth segment of the male not elevated dorsally, vulvar spine?" Considerable orange and red in the coloration, with black markings. Brazil. (Fig. 96.)

Tigriagrion Calvert, 1909

43 (48). Wing not petioled all the way to Ac.....44

44 (47). Genera of the New World.....45

45 (46). Abdomen chiefly red. The costal side of the stigma not shorter than the proximal or distal sides. Cu_1 extending at least to or beyond the level of the base of M_{1a}. Cu_2 to or beyond that of M_2. In the hind wing the inner end of the quadrangle not as long as the upper side. North and South America. (Fig. 88.)

Amphiagrion Selys, 1876

46 (45). Abdomen generally with some red. The costal edge of the stigma is shorter in the hind wing than the proximal or distal sides. Venation otherwise much like the preceding. Mexico and United States. (Fig. 95.)

Hesperagrion Calvert, 1902

47 (44). Genus of the Old World. Front margin of the stigma longer than the posterior one. Quadrangle exceedingly narrow. South Abyssinia.

Thermagrion[21] Foerster, 1906

48 (43). Wing petioled to or beyond Ac.....49

49 (50). A genus of the Old World. Coloration largely black and blue. Tibiae with long spines. Lower tooth of tarsal claw almost as large as the upper. Oceanica. (Fig. 116.).....**Xiphiagrion** Selys, 1876

50 (49). Genera of the New World.....51

51 (52). M_3 not arising very close to the subnodus, but at least one-half cell before it. Coloration light, much red. Color pattern of dorsum of thorax with no markings darker than brown. Some blue often present. South America and Western North America. (Fig. 109.).....**Oxyagrion** Selys, 1876

52 (51). M_3 arising very near the subnodus, not more than one-fifth of a cell before it. Abdomen chiefly reddish and yellowish. (Fig. 127.)

Leptobasis Selys, 1877

54 (42). Female without apical spine on segment eight.....54

54 (55). Two complete rows of cells beyond the stigma between C and R_1, this area much broader than the corresponding one between R_1 and M_1. The wing-margin slightly indented at the stigma. Considerable red in the body coloration. East Indies. (Fig. 87.).....**Oreagrion** Ris, 1913

55 (54). Rarely two complete rows of cells beyond the stigma between C and R_1. Wing-margin not indented at the stigma.....56

[21] Studied from description only.

56 (59). Wing very evidently not petioled to the level of Ac; petiolation ceasing as far before it as Ac is long.....57

57 (58). Colors red and dark bronze. Europe and Mediterranean Region to China. (Fig. 89.).....**Pyrrhosoma** Charpentier, 1840

58 (57). Coloration without red, but is bronze varied with blue, green, or yellow. Europe, Asia Minor, and Chili? (Fig. 90.)....**Erythromma** Charpentier, 1840

59 (56). Wing petioled very close to the level of Ac.....60

60 (71). Genera of the New World.....61

61 (68). Wing not petioled beyond Ac. Tarsal claw with rather strong inferior tooth.....62

62 (63). Postnodals eighteen to twenty, Cu_2 extending to the level of the base of M_{1a}, which arises four or more cells before the stigma. Colors of the dorsum blue and black; yellow beneath the thorax. United States and Canada. (Fig. 108.)

Chromagrion Needham, 1903

63 (62). Postnodals fourteen or fewer, Cu_2 not extending to the level of the base of M_{1a}, the latter arising one to two cells before the stigma.....64

64 (67). Coloration not reddish. Abdomen usually thirty or more millimeters long.....65

65 (66). The descending cross-vein from the subnodus continuous to the wing-margin. R_s and M_s narrowly separated at the proximal cross-vein between them. Tooth on tarsal claw well developed but distinctly shorter than the claw. Male inferior appendages well developed. South America. (Fig. 120.)

Aeolagrion[22] Williamson, 1917

66 (65). The descending cross-vein from the subnodus not continued directly to the wing-margin. Tooth on the tarsal claw large, almost as large as the claw; male inferior appendages rudimentary. R_s and M_s widely separated at the proximal cross-vein between them. South America. (Fig. 119.)

Leptagrion Selys, 1876, sens. strict.

67 (64). Coloration reddish. Tarsal claw with a small inferior tooth. Abdomen generally less than thirty millimeters long. United States and West Indies to Brazil. (Fig. 122.).....**Telebasis** Selys, 1865

(*Erythragrion* Selys, 1876)

68 (61). Wing petioled beyond Ac. Tarsal claw with a very small or no inferior tooth.....69

69 (70). M_2 arising nearest the fifth or sixth postnodals in the hind wings; at the sixth or beyond in the front wings. Tarsal claw toothless; superior appendages of male not bent down almost at a right angle in their apical half. Genital valves of the female not reaching far beyond the level of the tips of the abdominal appendages. Central America to Brazil. (Fig. 126.)

Metaleptobasis Calvert, 1907

[22] This genus includes *Leptagrion dorsale*, hence *Hylaeagrion* of Foerster, 1906. Williamson (Entom. News, 1917, p. 241) arrives at the conclusion that Foerster's *Hylaeagrion argentolineatum* is in reality *L. dorsale*, and his *H. croceum* Selys is *Leptobasis*, probably *vacillans*. Therefore the generic name *Hylaeagrion* falls, *L. dorsale* becomes the type of *Aeolagrion* and *L. macrurum* is that of *Leptagrion*.

70 (69). M_3 arising nearest the fourth postnodal in the hind wings, the fifth in the front wings. Tarsal claws toothed. The superior appendages of the male bent down almost at a right angle in their apical half. Genital valves of the female reach far beyond the level of the tips of the abdominal appendages. West Indies and Brazil. (Fig. 127.) ..... **Leptobasis** Selys, 1877

71 (60). Genera of the Old World 72

72 (83). M_3 arising very distinctly before the subnodus 73

73 (80). Inferior tooth of tarsal claws well developed, when compared with the superior tooth 74

74 (75). Wing ten to twelve mm. long; arculus distinctly beyond the second antenodal, inner end of quadrangle lacking in the male. Postnodals six to eight. Australia. (Fig. 106.) ..... **Hemiphlebia** Selys, 1869

75 (74). Wing usually twenty or more mm. long; arculus near the level of the second antenodals; inner end of quadrangle present 76

76 (77). Coloration yellowish or reddish. India to Australia and Africa. (Fig. 117.) ..... **Ceriagrion**[23] Selys, 1876

77 (76). Coloration not light 78

78 (79). Largely black. Tibial spines long. Fiji Islands and New Guinea. **Nesobasis**[24] Selys, 1891

79 (78). Bronze and dark. Tibial spines very short. Aru and Bivak Islands. (Fig. 118.) ..... **Papuagrion** Ris, 1913

80 (73). Inferior tooth of the tarsal claw lacking or very small 81

81 (82). Largely black. Tibial spines long. Malaysia and Polynesia. **Nesobasis**[24] Selys, 1891

82 (81). Coloration bronze, varied with green and black, wings broad. Black bands on head, thorax, and abdomen. Africa ..... **Argiagrion**[24] Selys, 1876

83 (72). M_3 arising almost or quite at the subnodus 84

84 (87). R_4 arising at the subnodus 85

85 (86). Stigma square or oblong, followed by a single row of cells. Coloration not very metallic. Malaysia. (Fig. 128.) **Teinobasis** Kirby, 1890 (*Telebasis* Selys, 1877)

86 (85). Stigma five-sided and followed by two rows of cells. Malaysia and Polynesia ..... **Pericnemis**[24] Selys, 1863

87 (84). R_4 arising beyond the subnodus; M_3 also slightly beyond or at the subnodus. Wing petioled to or beyond the level of the arculus. Malaysia. (Fig. 129.) ..... **Amphicnemis** Selys, 1863

88 (41). Pale postocular spots present on a dark background, although sometimes confluent with the light coloring of the rear of the head; apparently so in those genera with dichromatic females 89

[23] *Ceriagrion* is here used to include *Brachybasis;* in the opinion of Dr. Ris the latter cannot stand as a genus. See p. 317 of his "Odonatanach den Sammlungen L. Schultzes und Katalog der Odonaten von Suedafrika," 1908. Denkschr Med.-natwiss. Ges. Jena, 13: 303-346.

[24] Studied from description only.

89 (94). Stigma in fore and hind wings of males dissimilar in color, size or both Tenth segment of abdomen of male generally with a bifid dorsal process. Female often with apical spine to segment eight of abdomen. Postocular spots, in female at least, tend to disappear. Females dichromatic or polychromatic....90

90 (91). In the male the stigma of the front wing does not touch the costa. Female with no external black stripe on second or third tibiae. Coloration black, orange, and yellowish. Postocular spots, in females at least, tend to disappear. United States to Venezuela and West Indies. (Fig. 97.)

Anomalagrion Selys. 1857

91 (90). Stigma in male touching C. Female generally with an external black stripe on second and third tibiae....92

92 (93). Penis with pair of erect spines on the penultimate segment. In American species at least, the anterior surface of thorax not solid black. Cosmopolitan. (Fig. 100.)..... **Ischnura** Charpentier, 1840. (*Micronympha* Kirby, 1890)

93 (92). Penis with pair of erect spines on penultimate segment. Anterior surface of thorax solid black, except in green females, middle prothoracic lobe with small tooth on each side. Arizona to Baja California. (Fig. 101.)

Celaenura Kennedy, 1917

94 (89). Stigma in fore and hind wings of male similar....95

95 (102). The second antenodals distinctly before the level of the arculus. Both wings not petioled to Ac, but the vein from Ac back to the wing-margin, that is A′, does not continue the direction of the petioled part of the margin, instead it passes up toward Ac and Ab....96

96 (97). Female with apical spine on segment eight. Postnodals six to seven. Coloration dark bronze, with yellow and blue. Dichromatic females. A genus of the New World—tropical America and the West Indies. (Fig. 102.)

Ceratura Selys, 1876

97 (96). Female without apical spine. Old World genera....98

98 (101). Postnodals five to nine; females dichromatic; very small insects, usually less than 24 mm. long....99

99 (100). Quadrangle of fore wing with upper side less than half as long as the lower side; hence distal angle very acute. Legs very long in comparison with rest of body. Australia. (Fig. 103.)....**Austrocnemis** Tillyard, 1913

100 (99). Quadrangle of fore wing with upper side one-half or more than one-half of length of lower. Legs short. Australia to India. (Fig. 104.)

Agriocnemis Selys, 1869

101 (98). Postnodals ten to twelve; females not dichromatic; chiefly insects of more moderate size i.e. abdomen of twenty-five or more mm. India to Australia, and in Zanzibar and Madagascar. (Fig. 105.)....**Argiocnemis** Selys, 1877

102 (95). The second antenodals not distinctly before the arculus, or if so, either one wing petioled to Ac or the vein A′ continues direction of the hind margin of wing up to point of petiolation....103

103 (116). Both wings distinctly not petioled to the level of Ac....104

104 (111). Female without apical spine to segment eight....105

105 (106). Stature very slender, abdomen especially so. Coloration metallic and brilliant, similar in both sexes. Europe, China, North and South America. (Fig. 91.).....**Nehalennia** Selys, 1850

106 (105). Stature more robust, abdomen not extremely slender; coloration not very brilliant and dissimilar in sexes.....107

107 (108). Postocular spots elongated, almost linear, with other transverse lines between them. Two small clear spots between the ocelli. Superior appendages of male longer than last abdominal segment and arcuate. Europe, Asia Minor, Japan, South Africa. (Fig. 92.).....**Cercion**[25] Navas, 1907

108 (107). Postocular spots cuneate or rounded, no spots between the ocelli. Superior appendages often short and straight.....109

109 (110). Species of Hawaiian Islands. Characters variable. (Fig. 93.)
Megalagrion[26] McLachlan, 1883

110 (109). Not Hawaiian, nor Australian, otherwise quite cosmopolitan. (Fig. 94.)
Coenagrion Kirby, 1890
(*Agrion* Fabricius, 1775)

111 (104). Female with apical spine on segment eight.....112

112 (113). Costal edge of stigma shorter than the proximal or distal edges. Cu_1 reaching the level of base of M_{1a}, Cu_2 that of origin of M_2. Postocular spots sometimes disappearing. United States and Mexico. (Fig. 95.)
Hesperagrion Calvert, 1902

113 (112). Costal edge of stigma as long as proximal or distal edges.....114

114 (115). M_2 of hind wing generally arising at or beyond the fourth postnodal, tenth segment of male not elevated. Coloration of male generally blue, of female green or yellow, sometimes blue. Cosmopolitan, not in Australia. (Fig. 98.).....**Enallagma** Charpentier, 1840

115 (114). Tenth segment of male elevated and with a bifid dorsal process. Penis with transverse row of short spines at base of distal or spatulate lobe. M_2 of hind wing arises at about the fifth postnodal. California. (Fig. 99.)
Zoniagrion Kennedy, 1917

116 (103). One or both wings petioled practically to or even beyond the level of Ac.....117

117 (108). Pale postocular spots widely confluent with the pale color on the rear of the head. M_2 arising nearest the fourth postnodal in the hind wings and the fifth in the front wings. Tarsal claws toothed. Superior appendages of the male bent down almost at a right angle in their apical half. Genital valves of female reaching far beyond the level of the tips of the abdominal appendages. West Indies to Brazil. (Fig. 127.).....**Leptobasis**[27] Selys, 1877

[25] *Cercion* has been shown by Kennedy, 1917, Ent. News, to include *C. lindenii*, *C. quadrigerum*, and *C. punctum*, all formerly considered species of *Coenagrion*.

[26] *Megalagrion* was said by Perkins (Fauna Hawaiiensis Vol. I, p. clxxv and Vol. II, pp. 63 to 77 and 693 to 696) to have been separated by McLachlan from the genus *Coenagrion* on inconstant characters. Kennedy (Ent. News, 1917), in a study of the penes of many of the Hawaiian species, considers it probable that all the species of those islands may be considered as comprising the genus *Megalagrion*.

[27] Pale postocular spots not always present. Females sometimes with, sometimes without, vulvar spine. See (52) and (70).

118 (117). Pale postocular spots not widely confluent with the pale color on the rear of the head.....119
119 (124). Female with apical spine to segment eight[28].....120
120 (121). Genus of the New World. Colors bronze and blue or greenish. The eighth or ninth or tenth segments blue. End of tenth more or less prolonged or turned back. Mexico to South America. (Fig. 110.)
Acanthagrion Selys, 1876
121 (120). Genera of the Old World.....122
122 (123). M_3 arising before the subnodus; front wing with twelve to fifteen postnodals. Coloration yellowish, greenish and bluish with black markings. Kilimanjaro and Meru, Africa.....**Mombagrion**[29] Sjöstedt, 1909
123 (122). M_3 arising almost at the subnodus; front wing with nine to twelve postnodals. Coloration black, blue, and dark green. Malaysia and West Africa. (Fig. 123.).....**Aciagrion** Selys, 1892
124 (119). Female without apical spine on segment eight.....125
125 (128). Genera of the New World.....126
126 (127). Tips of the wings similar, abdomen very long and slender. Tenth segment of male not forked. Coloration greenish or yellowish. M_{1a} arising one or two cells before the stigma. Eastern United States and Brazil. (Fig. 111.)
Telagrion Selys, 1876
127 (126). Tips of front and hind wings of male unlike; R_1 and M_1 in the hind wing almost unite at the tip. Segment ten of the male with a tubercle above and two spines. Coloration bluish or reddish, or brownish. Mexico to Central America. (Fig. 125.).....**Anisagrion** Selys, 1876
128 (125). Genera of the Old World.....129
129 (138). M_3 arising quite distinctly before the subnodus. Tarsal claw generally with an inferior tooth.....130
130 (133). Prothorax of female provided with two hooks which project forward..131
131 (132). Ac at or but slightly beyond the level of the first antenodals, not more than one-fourth the distance to the second ones. Coloration blue. Australia. (Fig. 107.).....**Caliagrion** Tillyard, 1912
132 (131). In Australian species, at least, Ac is about one-half way between the first and second antenodals. Superior appendages of male usually forked or hollowed at tips. Africa and Asia to Australia. (Fig. 114.) **Pseudagrion** Selys, 1876
133 (130). Prothorax of female simple, no hooks present.....134

[28] *Skiallagma* sometimes has traces of postocular spots; female unknown. See description in footnote to rubric forty-two.

Myagrion, female unknown. Male described as follows: Color carmine-red. Quadrangle irregular, upper side contained in the lower two and one-half times, in the front wing. Cu_2 thirteen cells long. M_2 arises six cells beyond the subnodus in the front wing, five in the hind wing. Abdomen very slender, legs short, tibial spines weak. Tergum of tenth abdominal segment produced into two spines, but without a tubercle such as occurs in *Anisagrion*. Appendages scarcely as long as these spines. South America, Foerster, 1914.

[29] Studied from description only.

134 (135). Ac at the level of the first antenodals. Postnodals eleven to fifteen. Coloration red. Australia and New Zealand. (Fig. 115.)
Xanthagrion Selys, 1876

135 (134). Ac about half-way between the first and second antenodals.....136

136 (137). Front wing not petioled quite to Ac, the hind wing so petioled. Inferior appendages of male much longer than superiors. New Zealand. (Fig. 112.)
Xanthocnemis Tillyard, 1913

137 (136). Both wings petioled to Ac. Superior appendages of male longer than inferior; small species of blue and bronze color. (Fig. 113.)
Austroagrion Tillyard, 1913

138 (129). M_3 arising very near to subnodus, almost touching base of R_4. Tarsal claw without an inferior tooth. Body slender. Malaysia to Australia. (Fig. 124.).....**Archibasis** Kirby, 1890
(*Stenobasis* Selys, 1877)

Key to the Genera of the Subfamily Protoneurinae

1 (4). Cu_2 one cell long.....2

2 (3). Usually more than 14 postnodal cells. Ac near the level of the first antenodals. M_{1a} arising six to eight cells before the stigma. Cu_1 is six to seven cells long. West Africa. (Fig. 130.).....**Chlorocnemis** Selys, 1863

3 (2). Less than 10 postnodal cells. Ac about midway between the antenodals. M_{1a} arising one cell before the stigma. Cu_1 is four cells long. Brazil. (Fig. 131.)
Proneura Selys, 1889

4 (1). Cu_2 reduced to a cross-vein or lacking, not projecting beyond MA.....5

5 (18). A not reduced to Ac, but extending beyond.....6

6 (13). A ending in MA, and not in Cu on the posterior side of the quadrangle, nor in the hind margin of the wing before MA. No "cubito-anal" cross-veins before Ac. That edge of the stigma along the margin of the wing as great as that along R_1. The quadrangle practically uniform in width.....7

7 (8). Labium with short lobes. The wings often not petioled to Ac. Cu_1 ending at or beyond the level of the subnodus. India, Africa, Malaysia. (Fig. 132.)
Disparoneura Selys, 1860 sens. strict.

8 (7). Labium with elongate lobes.....9

9 (10). Cu_1 ending three to five cells beyond the level of the subnodus. Wing petioled almost to Ac. Front wings with three cells between the subnodus and fork of M_{1+2}. Brazil. (Fig. 134.).....**Peristicta** Selys, 1860

10 (9). Cu_1 ending within a cell of the level of the subnodus. Wing petioled to or slightly beyond Ac. Often four or more cells between the subnodus and fork of M_{1+2}.....11

11 (12). Ac not nearer the level of the second antenodal than of the first. The first antenodal space generally more than one and one-half times as long as the second. Five or more cells in the hind wing beyond the stigma. Tibial spines short. West Indies, Central America to Brazil. (Fig. 133.).....**Neoneura** Selys, 1860
(*Caenoneura* Kirby, 1890)

12 (11). Ac nearer the level of the second antenodal than of the first. The first antenodal space less than one and one-half times the length of the second. Three or four cells beyond the stigma. Brazil. (Fig. 135.)...**Idioneura** Selys, 1860

13 (6). A ending in Cu under the quadrangle or in the wing margin, but not reaching MA.....14

14 (17). A ending in Cu on the posterior side of the quadrangle. A "cubito-anal" cross-vein generally present before Ac. That edge of the stigma along the wing margin shorter than that along R_1.....15

15 (16). Cu_1 ending generally some distance beyond the level of the fork of M_{1+2}, about two-thirds of the distance from the nodus to the stigma. M_{1+2} forking between one-third and one-half the distance from the subnodus to the stigma. Mexico to Venezuela. (Fig. 136.).....**Palaemnema** Selys, 1860

16 (15). Cu_1 ending not more than a cell or so beyond the fork of M_{1+2}, usually before it, M_{1+2} often forking less than one-third the distance from the subnodus to the stigma. Ceylon to Malaysia. (Fig. 137.).....**Platysticta** Selys, 1860

17 (14). A ending in the hind margin of the wing between Ac and MA. No cubito-anal cross-vein before Ac. The costal edge of the stigma as long as that edge along R_1. Southeastern Asia and Malaysia. (Fig. 138.)
Hypostrophoneura[30] gen. nov.

18 (5). The vein A reduced to Ac, not extending beyond.....19

19 (43). Ac distinctly beyond the level of the first antenodal; Cu_1 usually extending beyond the level of the subnodus.....20

20 (35). The subquadrangle shorter than the portion of the wing behind Cu+A and before Ac. Genera of the New World and two of the East Indies and Southern Asia.....21

21 (24). Genera of the Old World. Labium with short lobes. About sixteen postnodals.....22

22 (23). Accessory cross-vein before Ac. The costal edge of the stigma shorter than that along R_1. India to Malaysia. (Fig. 144.).....**Protosticta** Selys, 1885

23 (22). No accessory cross-vein before Ac. The costal edge of the stigma not shorter than that along R_1. Malaysia. { **Disparoneura** Selys, 1860, sens. lat. / *Caconeura*[31] Kirby, 1890 sens. strict. / *Alloneura*, Selys, 1860 sens. strict.

24 (21). Genera of the New World. Labium with elongated lobes. About twelve postnodals.....25

[30] This genus is created for those species of *Disparoneura* placed by Selys (1886) in the third group, and has as its type *gomphoides* Rambur. It is distinct from *Disparoneura*, sens. strict., by having A end before MA and not in MA, and by Cu_1 usually being much shorter than in *Disparoneura*. It receives its name from the fact that A turns downward: ὑποστροφη = a turning backward, and νεῦρον = nerve.

[31] As here treated this genus comprises only the first group of *Alloneura* as given by Selys (1886). It, therefore, contains the following species: C. *dorsalis* Selys, C. *lansbergei* Selys, C. *gracillima* Selys, C. *hyperythra* Selys, and C. *dohrni* Krueger. See rubric 49 for *Risioneura*. Dr. Ris and Mr. Laidlaw consider this section of *Caconeura* as belonging to *Disparoneura;* the genus *Caconeura* thus passes out of existence, since *C. dorsalis* is the genotype. See Ris (1915) and Laidlaw (1913).

25 (30). M_3 and R_s arising separately and the latter arising at the subnodus.....26

26 (27). Legs quite long; femora strongly compressed. Tibial spines long, numerous. Nodus not very oblique, so that Sc ends beyond the level of the base of M_3. Cuba. (Fig. 145.).....**Microneura** Selys, 1886

27 (26). Legs short; femora not compressed. Nodus oblique, so that Sc ends before the level of the base of M_3.....28

28 (29). Wings narrow, about one-sixth or one-seventh as wide as long. The first antenodal space twice as long as the second and also longer than the third. Ac often very near the level of the first antenodals. Cuba and Central America to Brazil. (Fig. 146.).....**Protoneura** Selys, 1857

29 (28). Wings broader, about one-fifth as wide as long. The first antenodal space twice as long as the second, and equal to the third. Ac usually at a level intermediate between the antenodals. British Guiana. (Fig. 147.)

Epipleoneura Williamson, 1915

30 (25). M_3 and R_s joined at their origin into a single vein arising beyond the subnodus; or they may arise as separate veins, but if so, R_s still arises beyond the subnodus.....31

31 (32). Cu_1 about two and one-half cells long, so that it passes through the cross-vein coming down from the subnodus. The first and third antenodal costal spaces about equal; the second much shorter, more than one-half of the third. Stigma long and narrow, twice as long as wide. British Guiana. (Fig. 148.)

Epipotoneura Williamson, 1915

32 (31). Cu_1 ending at the cross-vein descending from the subnodus. The three antenodal costal spaces about equal. Wings rather broad, almost one-fourth as wide as long. Stigma shorter.....33

33 (34). M_2 in the front wing arises at the seventh postnodal; in the hind wing at the fifth. British Guiana.....**Phasmoneura**[22] Williamson, 1916

34 (33). M_2 in the front wing arises before the seventh postnodal, usually at or before the sixth; in the hind wing at the fourth or before. British Guiana. (Fig. 149.).....**Psaironeura** Williamson, 1915

35 (20). The subquadrangle of about the same length as the space before Ac. Australian genera.....36

36 (39). Cu_1 more than one cell long and traversing the cross-vein coming down from the subnodus. The space between the fork of M_{1+2} and the base of M_{1a} is not over two-thirds as great as that between the fork of M_{1+2} and the subnodus.....37

37 (38). M_{1a} arising about five cells before the stigma in the hind wing. The quadrangle almost as long as the second antenodal space. Cu_1 extending six to seven cells beyond the quadrangle. New South Wales. (Fig. 139.)

Neosticta Tillyard, 1913

38 (37). M_{1a} arising about three cells before the stigma in the hind wing. The quadrangle shorter than the second antenodal space. Cu_1 extending three to four cells beyond the quadrangle. Australia. (Fig. 140.)

Austrosticta Tillyard, 1908

[22] Description only was available for this genus.

39 (36). Cu_1 not more than one cell long and not reaching the cross-vein which comes down from the subnodus (this true in the hind hind wing at least). The space between the base of M_{1a} and M_{1+2} at least four-fifths of that between the fork of M_{1+2} and the subnodus, in the hind wing.....40

40 (41). Cu_1 less than one cell long. M_3 arising before the subnodus. The stigma longer than wide. The second antenodal space about one-half as long as the third. The space between the forking of M_{1+2} and the base of M_{1a} is longer than that between the subnodus and the forking of M_{1+2}, in the hind wing. Australia. (Fig. 141.).....**Notoneura** Tillyard, 1913

41 (40). Cu_1 about one cell long. M_3 arising beyond the subnodus. The stigma about as wide distally as long. The second antenodal space as long as the third; the space between the base of M_{1a} and the forking of M_{1+2} not as long as that between the subnodus and the forking of M_{1+2} in the hind wing. Australia. (Fig. 142.).....**Oristicta** Tillyard, 1913

42 (19). Ac at or before the level of the first antenodals; Cu_1 usually not extending to the level of the subnodus.....43

43 (50). Cu_1 generally not reduced to a cross-vein, but extending beyond MA. Cu_2 may be lacking. R_1 on lower side of stigma not zigzag, but straight.....44

44 (47). Quadrangle widened distally. Area back of M_4 beyond MA broad, at least one-third as great as the width of the wing at that point.....45

45 (46). Head very small, thorax narrow, legs short, abdomen exceedingly attenuate. About nine postnodals. Australia. (Fig. 141.) **Notoneura** Tillyard, 1913

46 (45). Head larger, thorax not so narrow, but form robust, tibiae with many spines. About fourteen postnodals. Australia. (Fig. 151.)..**Nososticta** Selys, 1860

47 (44). Quadrangle not widened distally. Area beyond MA not so broad as above.....48

48 (49). M_3 in some species arising just beyond subnodus. Cu_1 in species from East Indies is at least two cells long, in Australian species less. In Australian species at least, "both superior and inferior appendages of males somewhat forcipate, the inferior pair prolonged beyond the superior." New Caledonia, Bismarck Archipelago and Torres Straits. (Fig. 150.).....**Isosticta** Selys, 1885

49 (48). M_3 always arising before the subnodus. Cu_1 in the front wing almost always less than two cells long, generally ending in the first cell beyond MA. Malaysia to Bismarck Archipelago. (Fig. 152.).....**Risioneura**[33] gen. nov.

50 (43). Cu_1 reduced to a cross-vein, not extending beyond MA. R_1 on lower side of stigma zigzag. M_3 arising beyond the subnodus. New Guinea. (Fig. 153.) **Selysioneura** Foerster, 1900

[33] This genus is made for those species of *Caconeura* (*Alloneura*) included by Selys (1886) in his second group and differs from *Caconeura*, sens. strict., in having Ac situated under or before the first antenodals and Cu_1 rarely long enough to reach the cross-vein coming down from the subnodus. *R. plagiata* Selys is the genotype; the other species included are *R. insignis* Selys, *R. erythroprocta* Selys, *R. wallacii* Selys, *R. exul* Selys, *R. moluccensis* Selys, *R. flavipennis* Selys, *R. salomonis* Selys, *R. circumscripta* Selys, *R.*

VI—A PARTIAL LIST OF THE MOST IMPORTANT REFERENCES CONSULTED IN THE PREPARATION OF THIS PAPER

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1893 (b). The Odonate genus *Ortholestes*.
Proc. Acad. Nat. Sci. Philadelphia, 45: 377–382, fig.

1898. Odonata. A synonym and the bearing of its discovery on the classification of *Agrion*.
Entom. News, 9: 72.

1901–1908. Odonata. (in)
Biologia Centrali-Americana, Neuroptera: 17–420, 10 pls.
London, R. H. Porter and Dulau and Co.

1902. On the systematic position of *Thaumatoneura inopinata* McLachlan (Order Odonata), with some remarks on the classification of the suborder Zygoptera.
Entom. Mo. Mag., 38: 29–32.

1904. *Thaumatoneura* again.
Entom. News, 15: 216.

1909. Contributions to a knowledge of the Odonata of the Neotropical region, exclusive of Mexico and Central America.
Ann. Carnegie Mus., 6: 73–280, pls. 1–9.

1913. The fossil Odonate *Phenacolestes*, with a discussion of the venation of the legion Podagrion Selys.
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selysi **Foerster,** ***R. finisterrae*** Foerster, ***R. eburnea*** Foerster, ***R. fruhstorferi*** Krueger, ***R. pseudexul*** **Ris,** ***R. nigrifrons*** Ris, ***R. marina*** Ris, ***R. rosea*** Ris, ***R. dorsonigra*** Martin, and ***R. torrenticola*** **Foerster. It is dedicated to Dr. Ris, who has given us the most careful recent treatment of this group. See F. Ris, 1913, Odonata von den Aru-und Kei-Inseln, pages 508 to 514.**

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Termes. Fuzetek, 23: 81–108, figs.
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1906 (b). Libellen. (Forschungsreise durch Südschoa, Galla und die Somaliländer v. C. Frhr. v. Erlanger.)
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1891 (b). Übersicht der von Herrn Dr. Paul Preuss in Deutsch-West-Afrika 1890 gesammelten Odonaten.
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1895. *Archineura basilactea* W. F. Kirby = *Echo incarnata* Karsch.
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1862. Seconde légion: Lestes.
L. c., (2) 13: 288–338.
1862. Troisiéme légion: Podagrion.
L. c., (2) 13 : 5–44.
1863. Quatrième légion: Platycnemis.
L. c., (2) 16: 147–176.
1865. Cinquième légion: Agrion.
Genre *Argia*, l. c. (2) 20: 375–414.
1875. Genre *Agrion*, l. c., (2) 41: 247–322, 496–539, 1233–1309.
(2) 42: 490–531, 953–999.
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Explanation of Plates

Plate I

Fig. 1.—Wings of *Epiophlebia superstes* Selys. (Female, Cornell Collection.)
Fig. 2.—Hind wing of *Polythore gigantea* Selys. (Male, Cornell Collection.)
Fig. 3.—Hind wing of *Euthore fasciata* Selys. (Female, Cornell Collection.)
Fig. 4.—Hind wing of *Chalcopteryx rutilans* Rambur. (Male, Cornell Collection.)

Plate II

Fig. 5.—Hind wing of *Cora marina* Selys. (Male, Cornell Collection.)
Fig. 6.—Hind wing of *Climacobasis modesta* Laidlaw. (Male, after Williamson.)
Fig. 7.—Front wing of *Echo margarita* Selys. (Female, after Selys.)
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Fig. 9.—Hind wing of *Umma longistigma* Selys. (Male, Cornell Collection.)
Fig. 10.—Hind wing of *Sapho ciliata* Fabricius. (Female, Acad. Nat. Sci. Philadelphia.)

Plate III

Fig. 11.—Hind wing of *Agrion virgo* Linnaeus. (Female, Cornell Collection.)
Fig. 12.—Hind wing of *Matronoides cyaneipennis* Foerster. (Male, after Foerster.)
Fig. 13.—Hind wing of *Matrona japonica* Foerster. (Female, Cornell Collection.)
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Plate IV

Fig. 16.—Front wing of *Psolodesmus dorothea* Williamson. (Male, after Williamson.)
Fig. 17.—Front wing of *Phaon iridipennis* Burmeister. (Male, Cornell Collection.)
Fig. 18.—Front wing of *Vestalis gracilis* Rambur. (Female, Cornell Collection.)
Fig. 19.—Front wing of *Hetaerina americana* Fabricius. (Female, Cornell Collection.)
Fig. 20.—Front wing of *Lais globifer* Hagen. (Male, after Selys.)
Fig. 21.—Hind wing of *Pseudophaea ochracea* Selys. (Female, Cornell Collection.)

Plate V

Fig. 22.—Front wing of *Dysphaea dimidiata* Selys. (Male, after Selys.)
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Fig. 26.—Front wing of *Rhinocypha biforata* Selys. (Male, after Williamson.)
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Plate VI

Fig. 29.—Front wing of *Cyanocharis valga* Needham. (Male, Cornell Collection.)
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Plate VII

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Fig. 40.—Front wing of *Archilestes grandis* Rambur. (Male, Cornell Collection.)
Fig. 41.—Front wing of *Megalestes major* Selys. (Male, Cornell Collection.)
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Plate VIII

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Fig. 49.—Hind wing of *Pseudostigma aberrans* Selys. (Male, Acad. Nat. Sci. Philadelphia. From photograph by C. H. Kennedy.)
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Plate IX

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Fig. 54.—Front wing of *Trineuragrion percostale* Ris. (Male, after Ris.)
Fig. 55.—Front wing of *Rhinagrion macrocephalum* Selys. (Male, in Museum of Comparative Zoology. From photograph by E. Avery Richmond.)
Fig. 56.—Hind wing of *Argiolestes icteromelas* Selys. (From photograph by J. G. Needham.)
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Plate X

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Fig. 65.—Front wing of *Wahnesia montivagans* Foerster. (Male, in Acad. Nat. Sci. Philadelphia.)
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Plate XI

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Fig. 68.—Hind wing of *Heteragrion flavovittatum* Selys. (Cornell Collection.)
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Fig. 70.—Front wing of *Perilestes fragilis*? Selys. (Male?, after Calvert.)
Fig. 71.—Front wing of *Metacnemis valida* Selys. (Male, Museum of Comparative Zoology. From photograph by E. Avery Richmond.)
Fig. 72.—Hind wing of *Calicnemis eximia* Selys. (Female, Cornell Collection.)
Fig. 73.—Hind wing of *Copera marginipes* Rambur. (Male, in Acad. Nat. Sci. Philadelphia.)
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Plate XII

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Fig. 86.—Hind wing of *Argiallagma minuta* Selys. (Male, in Acad. Nat. Sci. Philadelphia.)
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Plate XIV

Fig. 91.—Front wing of *Nehalennia irene* Hagen? (Photograph, by J. G. Needham.)
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Fig. 95.—Hind wing of *Hesperagrion heterodoxum* Selys. (From photograph by J. G. Needham.)
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Fig. 102.—Hind wing of *Ceratura capreola* Hagen. (Cornell Collection. From photograph by J. G. Needham.)
Fig. 103.—Hind wing of *Austrocnemis splendida* Martin. (Male, in collection of Carnegie Museum. From drawing by C. H. Kennedy.)
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Fig. 106.—Front wing of *Hemiphlebia mirabilis* Selys. (Male, Cornell Collection.)
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Fig. 113.—Part of hind wing of *Austroagrion cyane* Selys. (Male, after Tillyard.)
Fig. 114.—Front wing of *Pseudagrion furcigerum* Rambur. (Male, from photograph by J. G. Needham.)
Fig. 115.—Front wing of *Xanthagrion erythroneurum* Selys. (From photograph by J. G. Needham.)
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Fig. 119.—Hind wing of *Leptagrion macrurum* Burmeister. (Male, after Needham.)
Fig. 120.—Hind wing of *Aeolagrion flammeum* Selys. (Collection of E. B. Williamson.)
Fig. 121.—Hind wing of *Skiallagma simulacrum* Calvert. (Male, in Acad. Nat. Sci. Philadelphia.)
Fig. 122.—Front wing of *Telebasis salva* Hagen. (From photograph by J. G. Needham.)
Fig. 123.—Hind wing of *Aciagrion pallidum* Selys. (Cornell Collection.)
Fig. 124.—Hind wing of *Archibasis mimetes* Tillyard. (Male, after Calvert.)

Plate XVIII

Fig. 125.—Hind wing of *Anisagrion truncatipenne* Calvert. (Male, Cornell Collection.)
Fig. 126.—Front wing of *Metaleptobasis manicaria* Williamson. (Male, Cornell Collection.)
Fig. 127.—Front wing of *Leptobasis vacillans* Selys. (Male, after Williamson.)
Fig. 128.—Hind wing of *Teinobasis metallica* Foerster. (After Ris.)
Fig. 129.—Front wing of *Amphicnemis wallacei* Selys. (Female, after Ris.)
Fig. 130.—Front wing of *Chlorocnemis elongata* Selys. (Male, in Acad. Nat. Sci. Philadelphia.)
Fig. 131.—Front wing of *Proneura prolongata* Selys. (Male, after Selys.)
Fig. 132.—Front wing of *Disparoneura* sp.? (After J. G. Needham.)
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Plate XIX

Fig. 134.—Hind wing of *Peristicta forceps* Selys. (Female, in Museum of Comparative Zoology. From photograph by E. Avery Richmond.)
Fig. 135.—Hind wing of *Idioneura ancilla* Selys. (Cornell Collection.)
Fig. 136.—Front wing of *Palaemnema paulina* Drury. (Male, Cornell Collection.)
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Fig. 138.—Hind wing of *Hypostrophoneura* sp.? (Male, Acad. Nat. Sci. Philadelphia.)
Fig. 139.—Hind wing of *Neosticta canescens* Tillyard. (Male, after Tillyard.)
Fig. 140.—Hind wing of *Austrosticta fieldi* Tillyard. (Male, after Tillyard.)
Fig. 141.—Hind wing of *Notoneura solitaria* Tillyard. (Male, after Tillyard.)
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Fig. 143.—Front wing of *Disparoneura dorsalis* Selys. (Male, in Acad. Nat. Sci. Philadelphia.)

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Fig. 144.—Hind wing of *Protosticta* sp.? (Female, in British Museum. From photograph by F. W. Campion.)

Fig. 145.—Hind wing of *Microneura caligata* Selys. (Male, Museum of Comparative Zoology. From photograph by E. A. Richmond.)

Fig. 146.—Hind wing of *Protoneura capillaris* Rambur. (Male, Cornell Collection.)

Fig. 147.—Front wing of *Epipleoneura incusa* Williamson. (Male, after Williamson.)

Fig. 148.—Front wing of *Epipotoneura nehalennia* Williamson. (Female, after Williamson.)

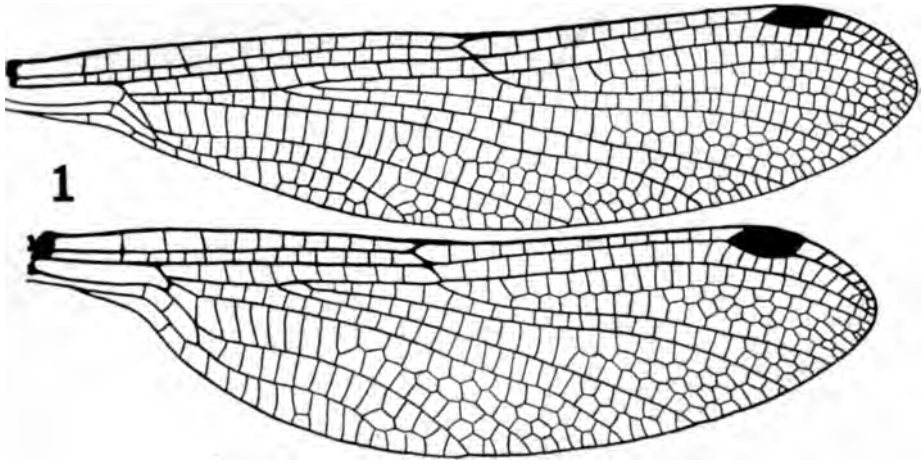
Fig. 149.—Hind wing of *Psaironeura remissa* Williamson. (Male, after Williamson.)

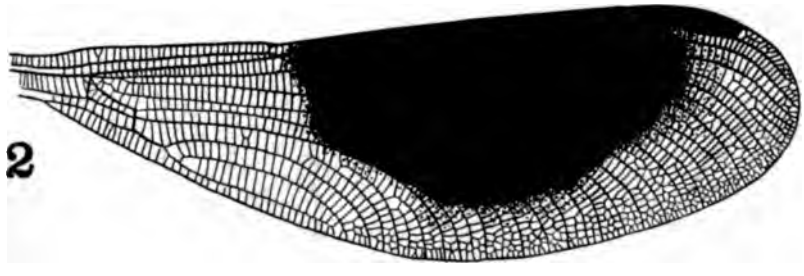
Fig. 150.—Front wing of *Isosticta spinipes* Selys. (Male, after Ris.)

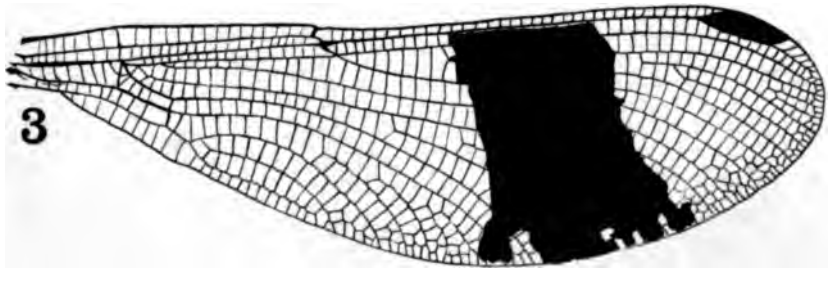
Fig. 151.—Hind wing of *Nososticta solida* Selys. (Female, Cornell Collection.)

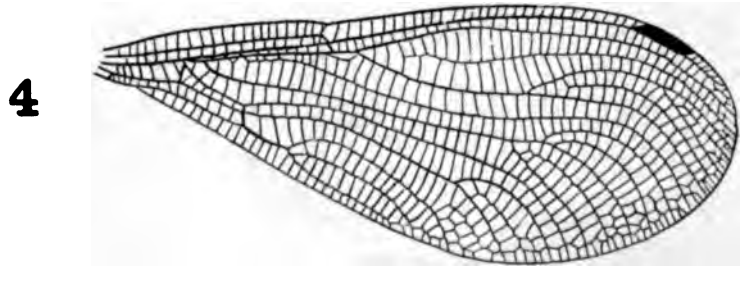
Fig. 152.—Hind wing of *Risioneura eburnea* Foerster. (Male, Cornell Collection.)

Fig. 153.—Wing of *Selysioneura cervicornu* Foerster. (Male, after Foerster.)









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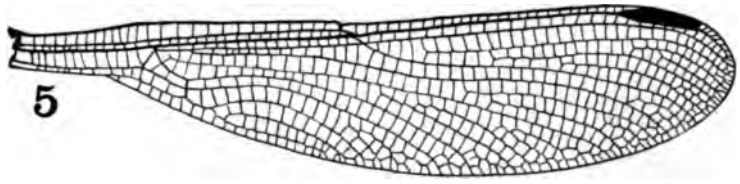

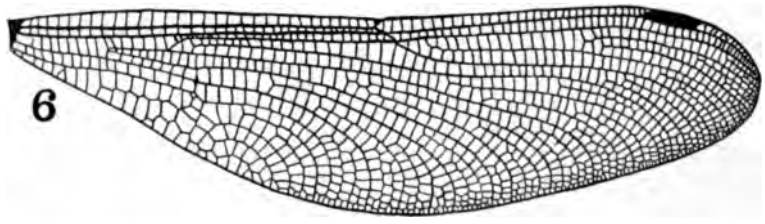

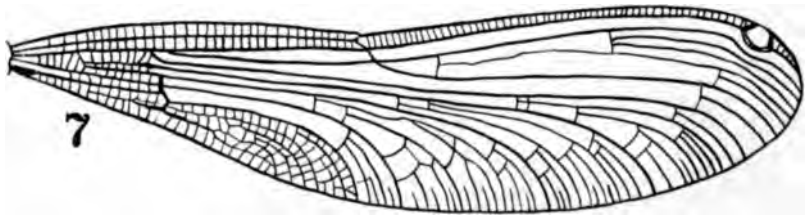

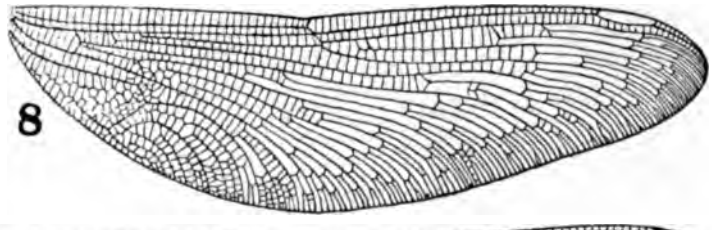

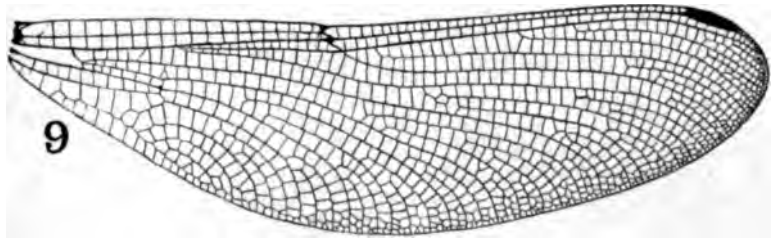

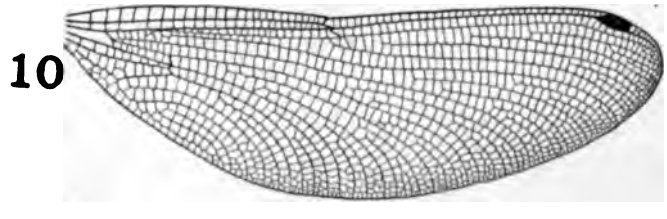

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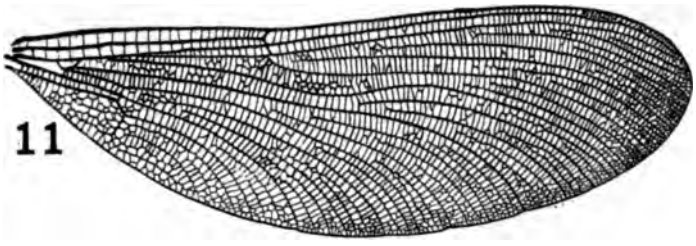

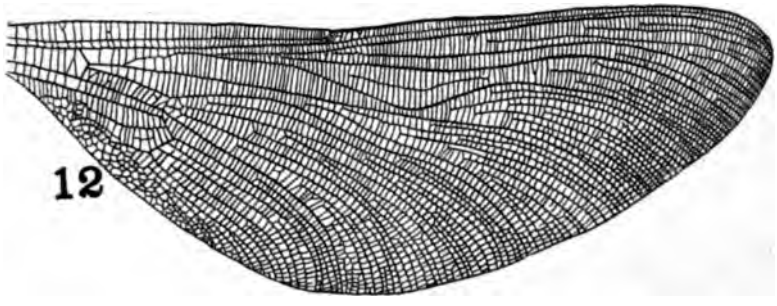

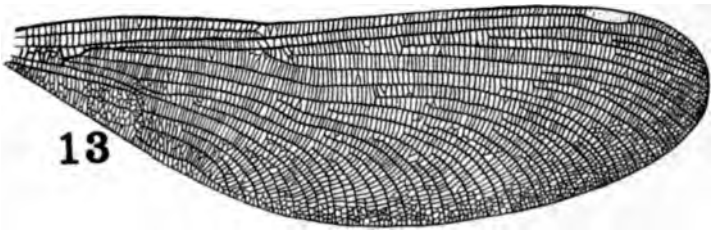

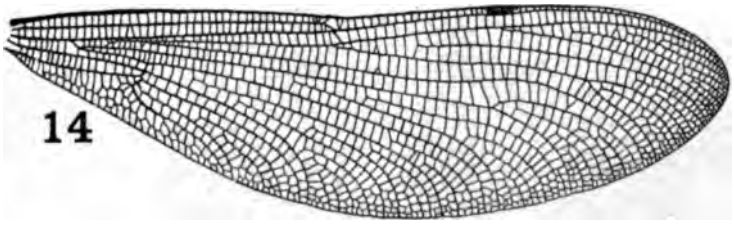

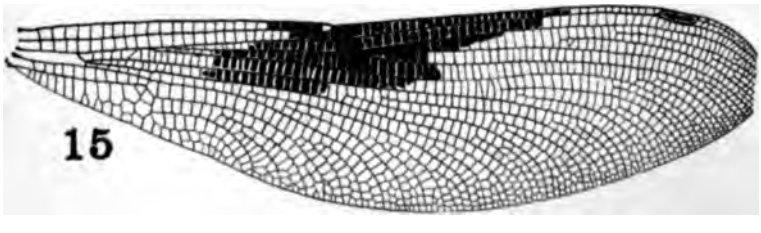

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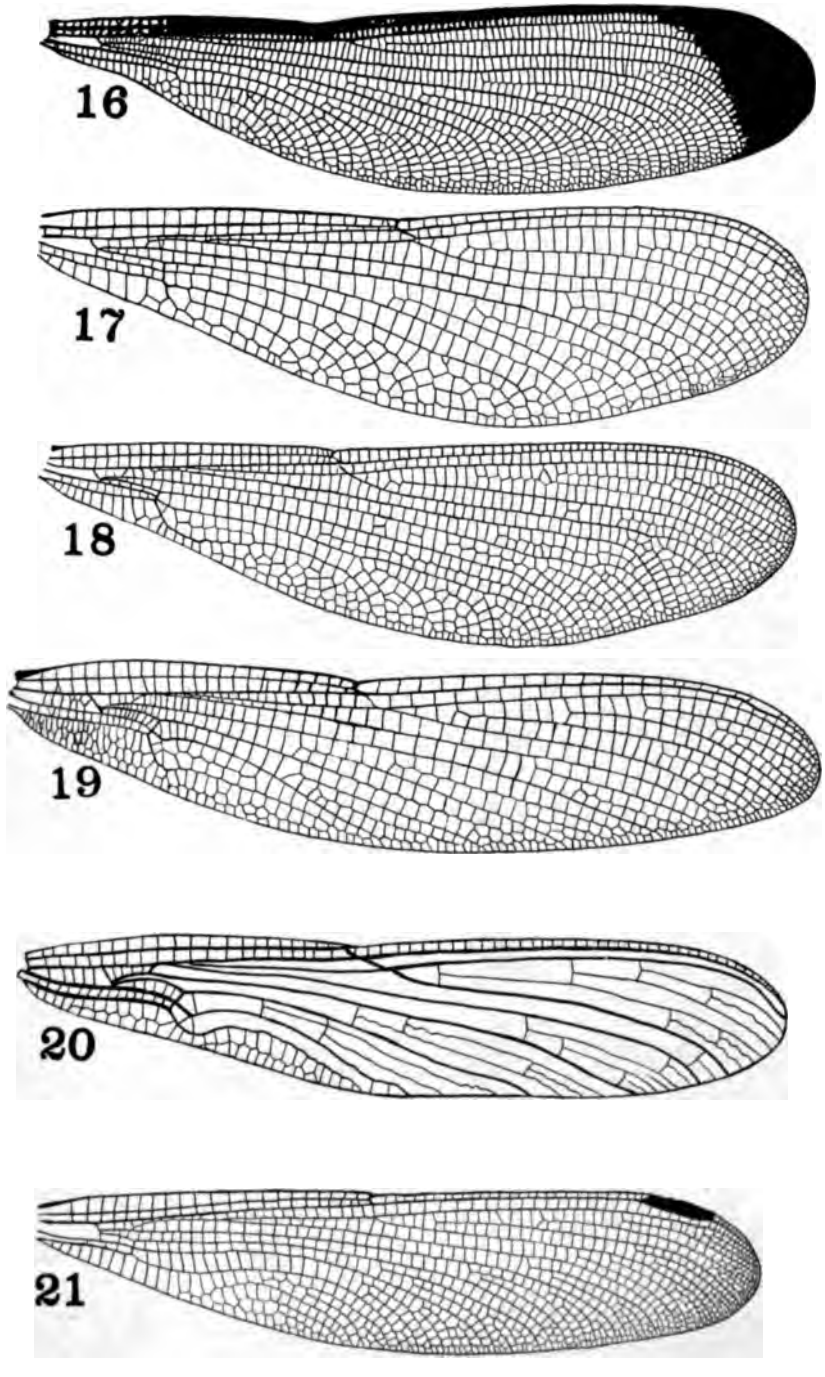

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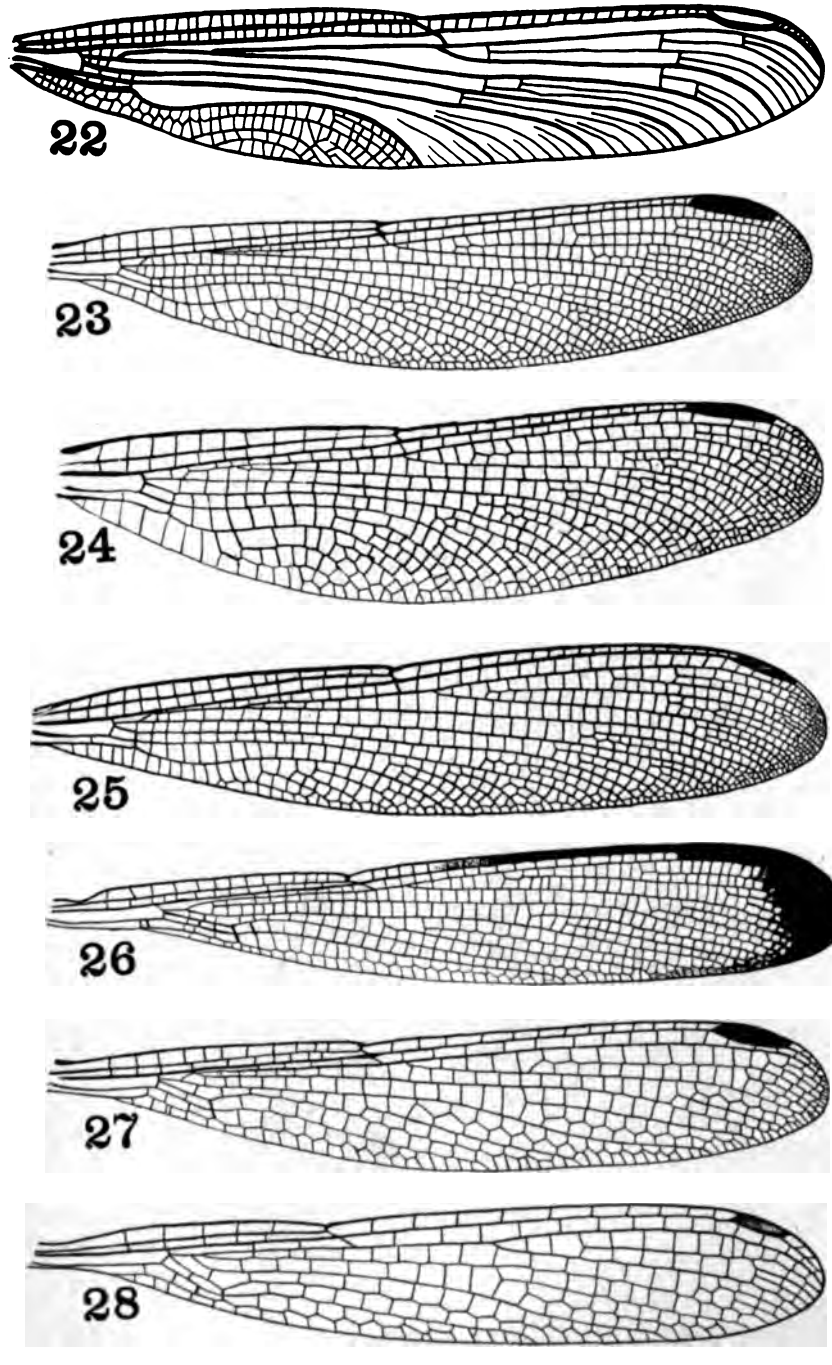

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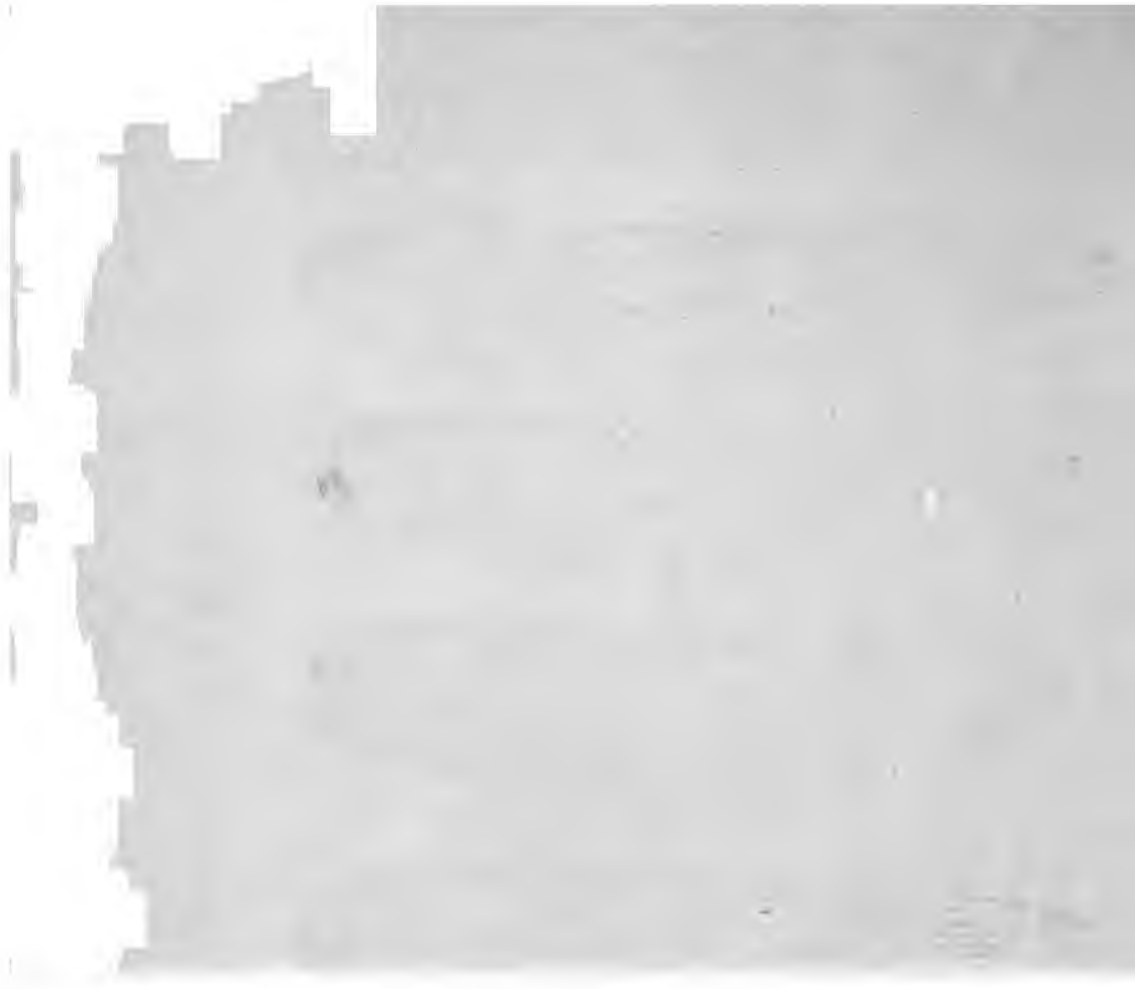

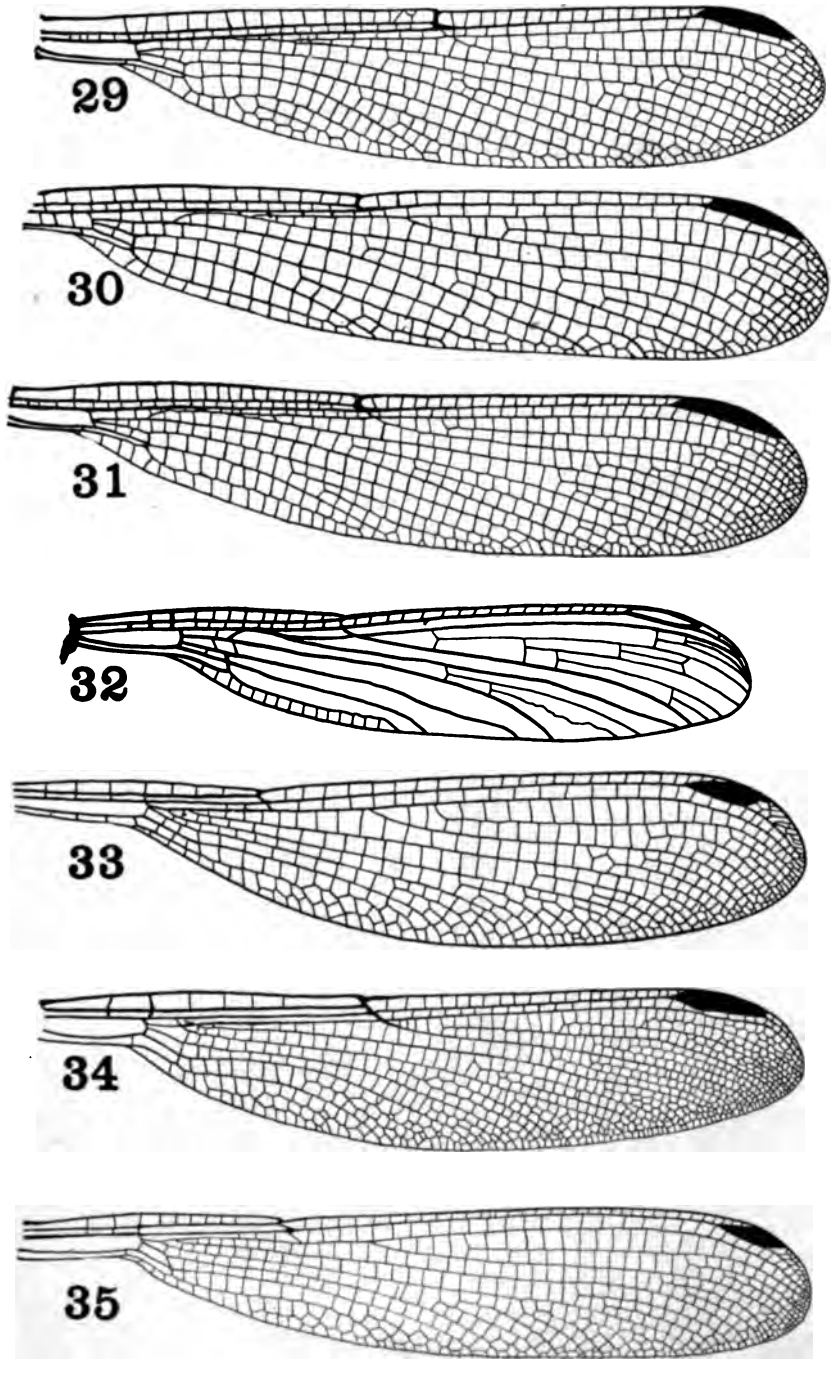

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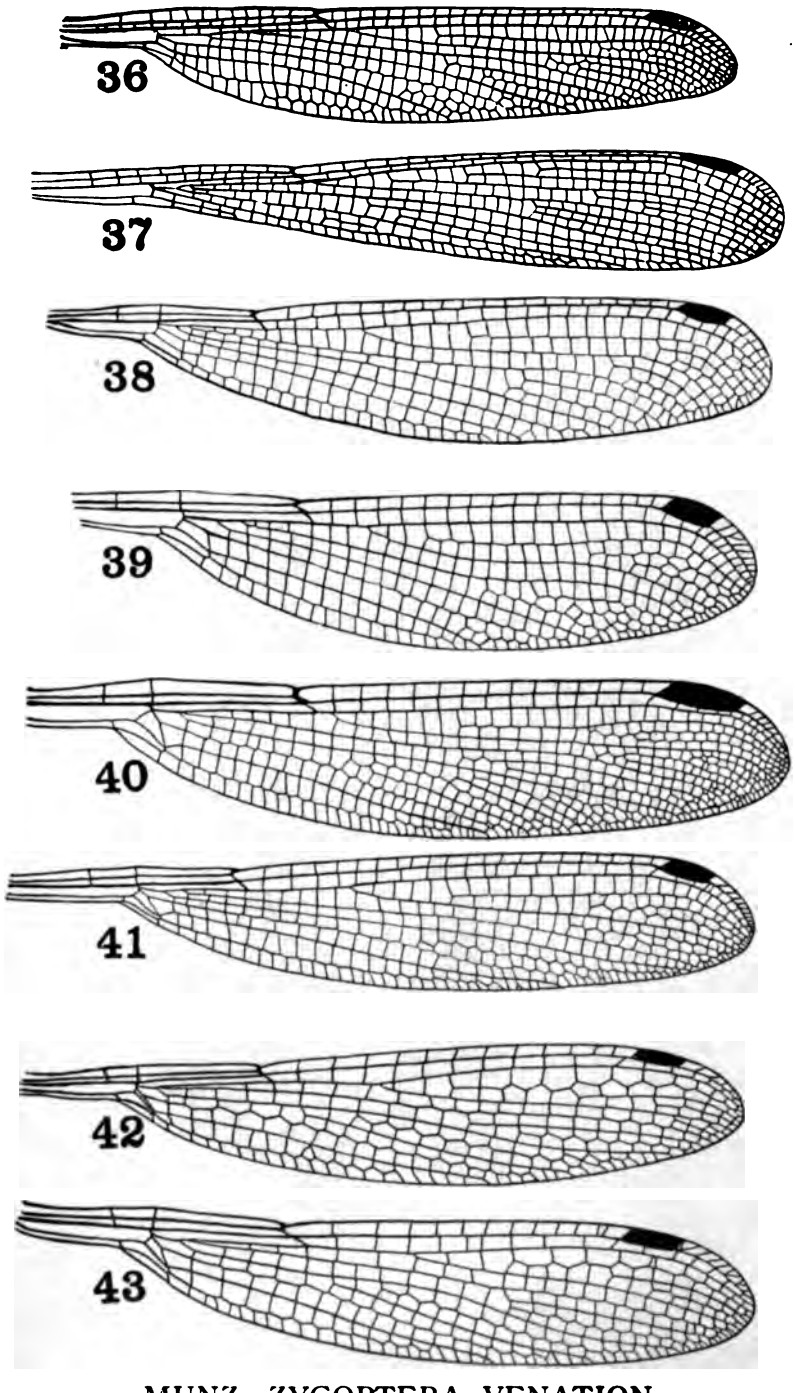

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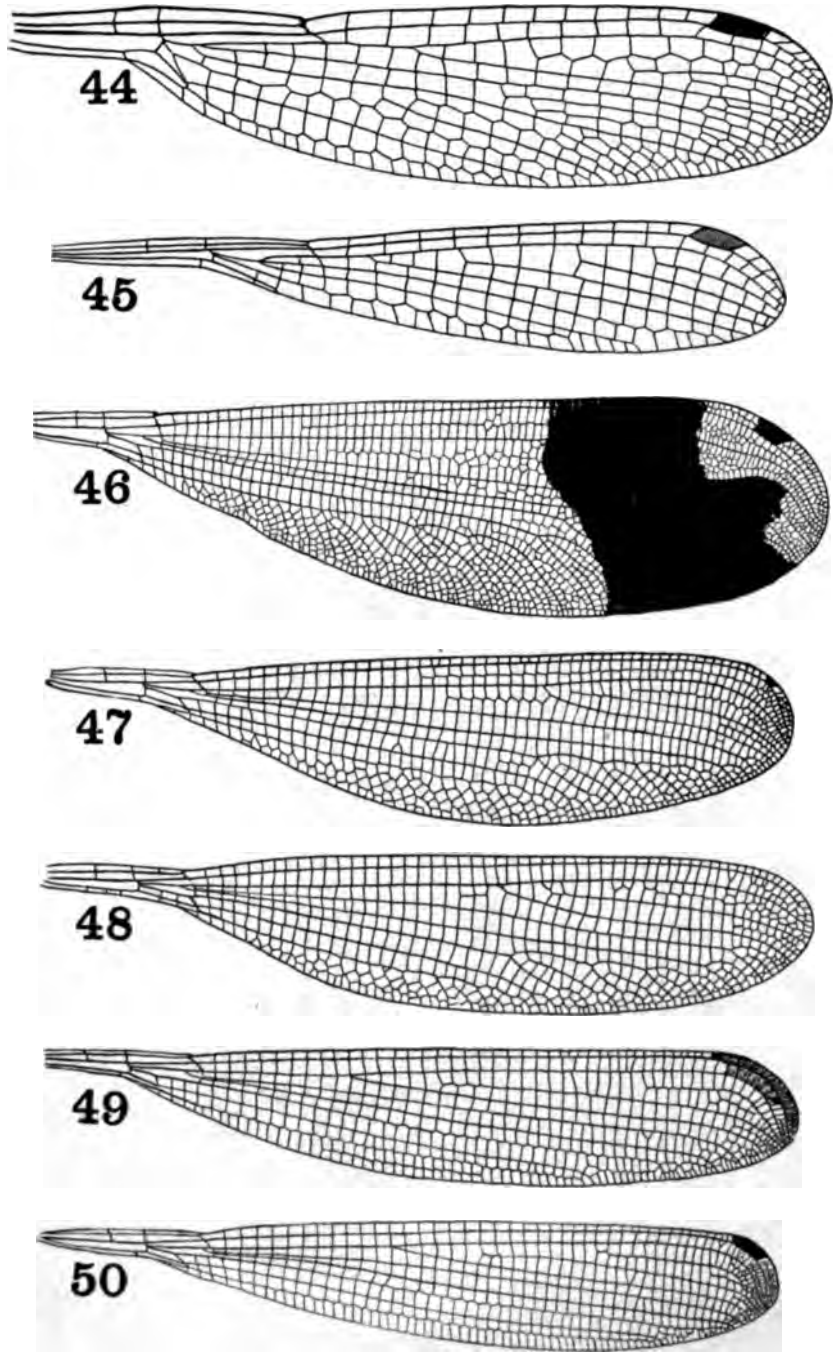

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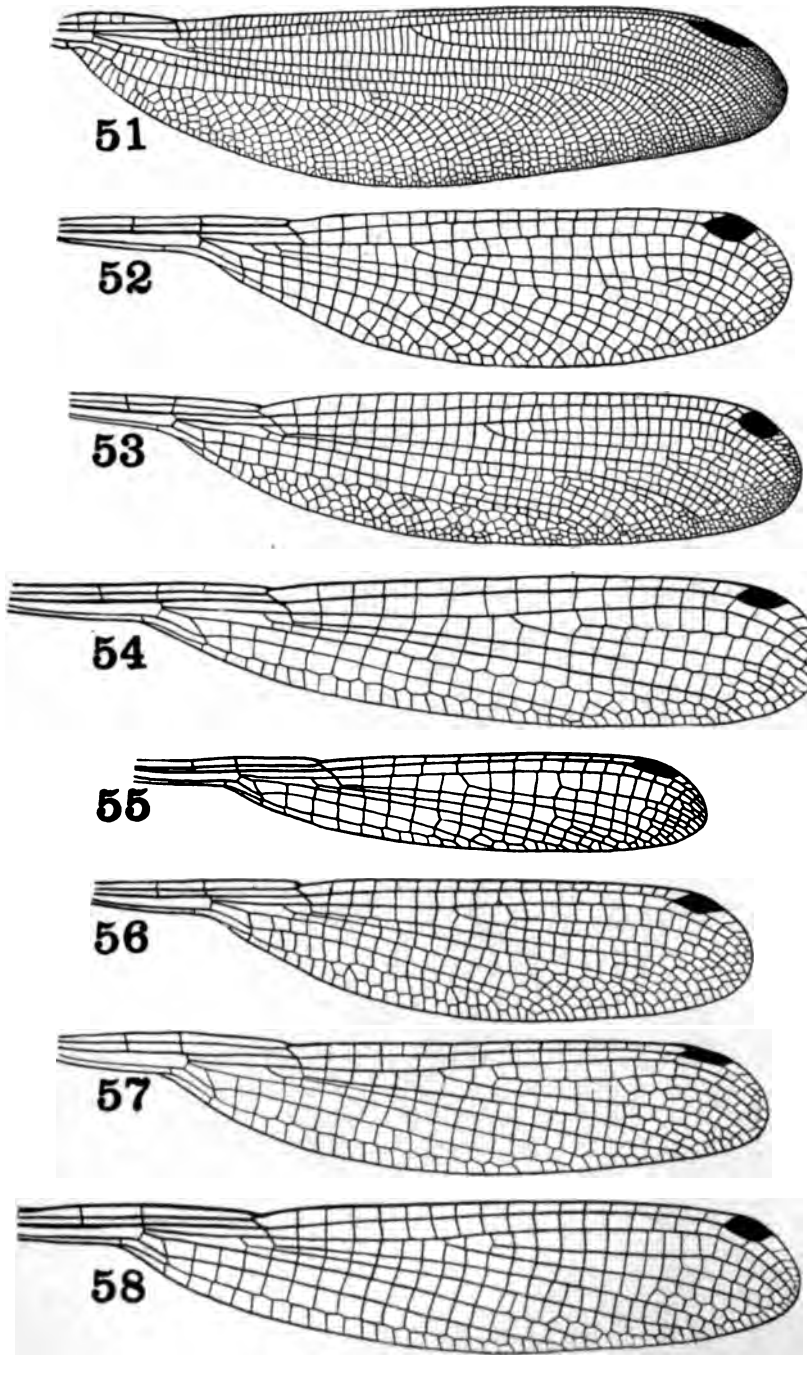

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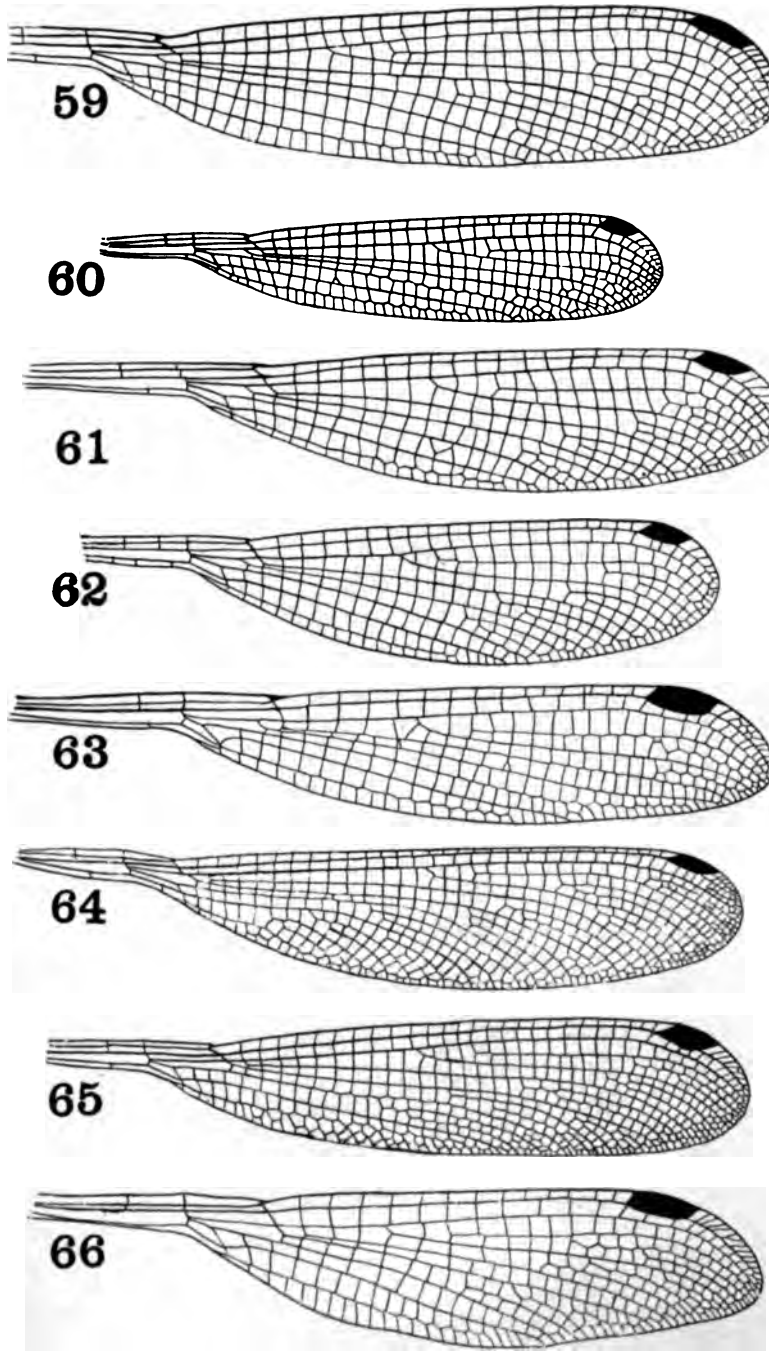

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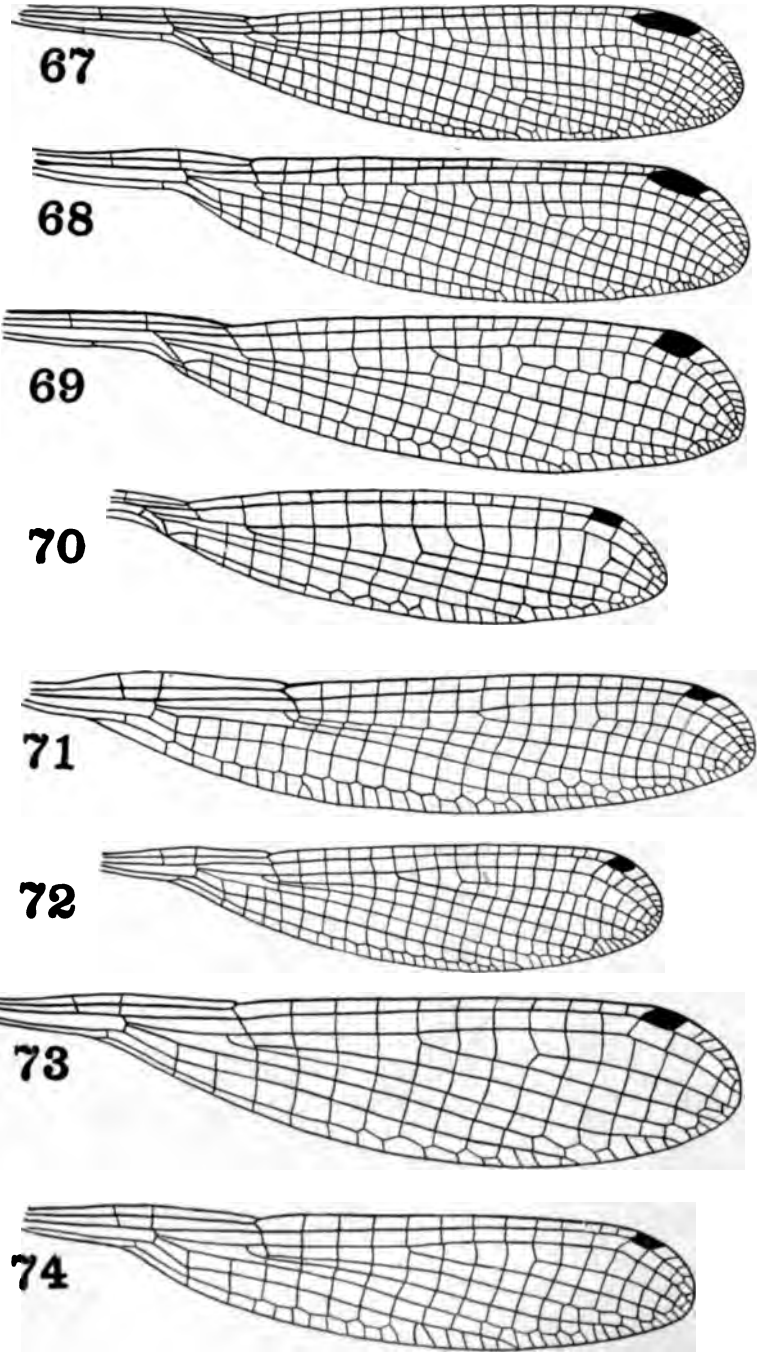

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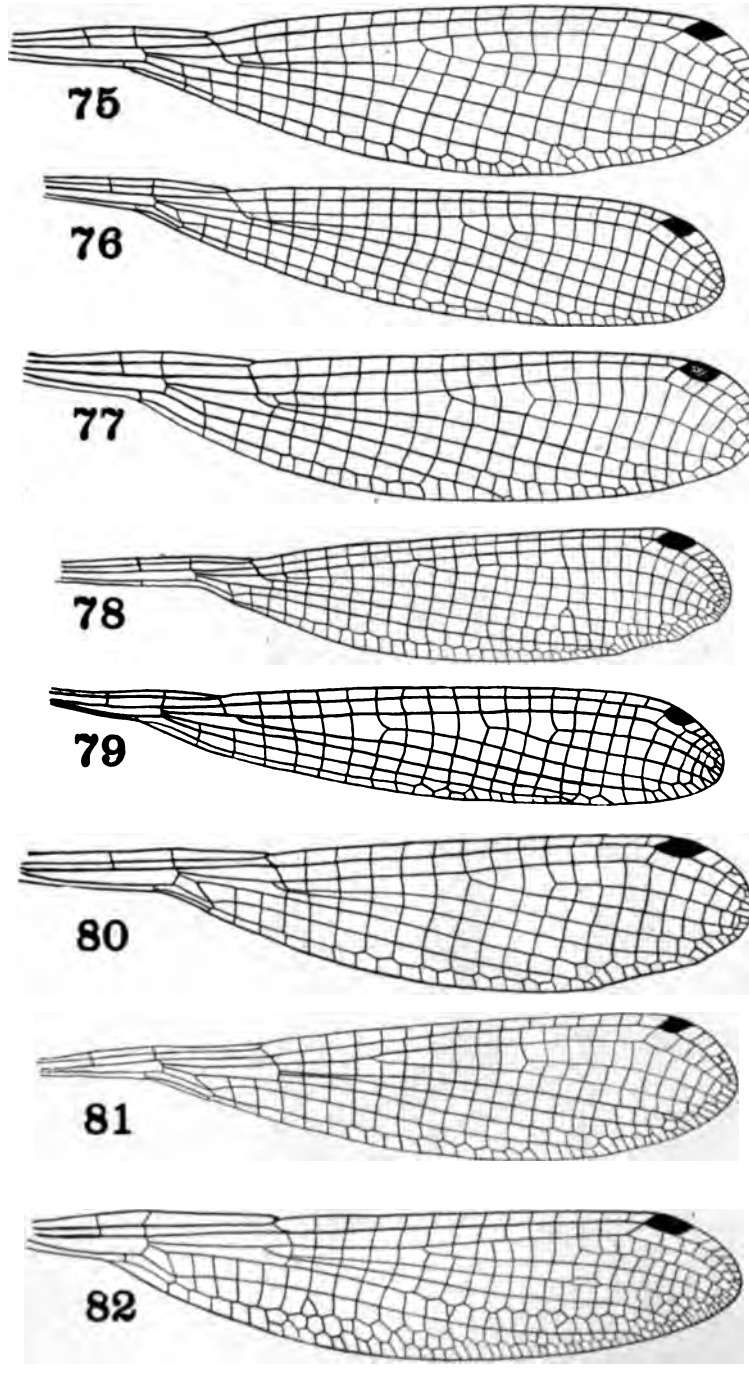

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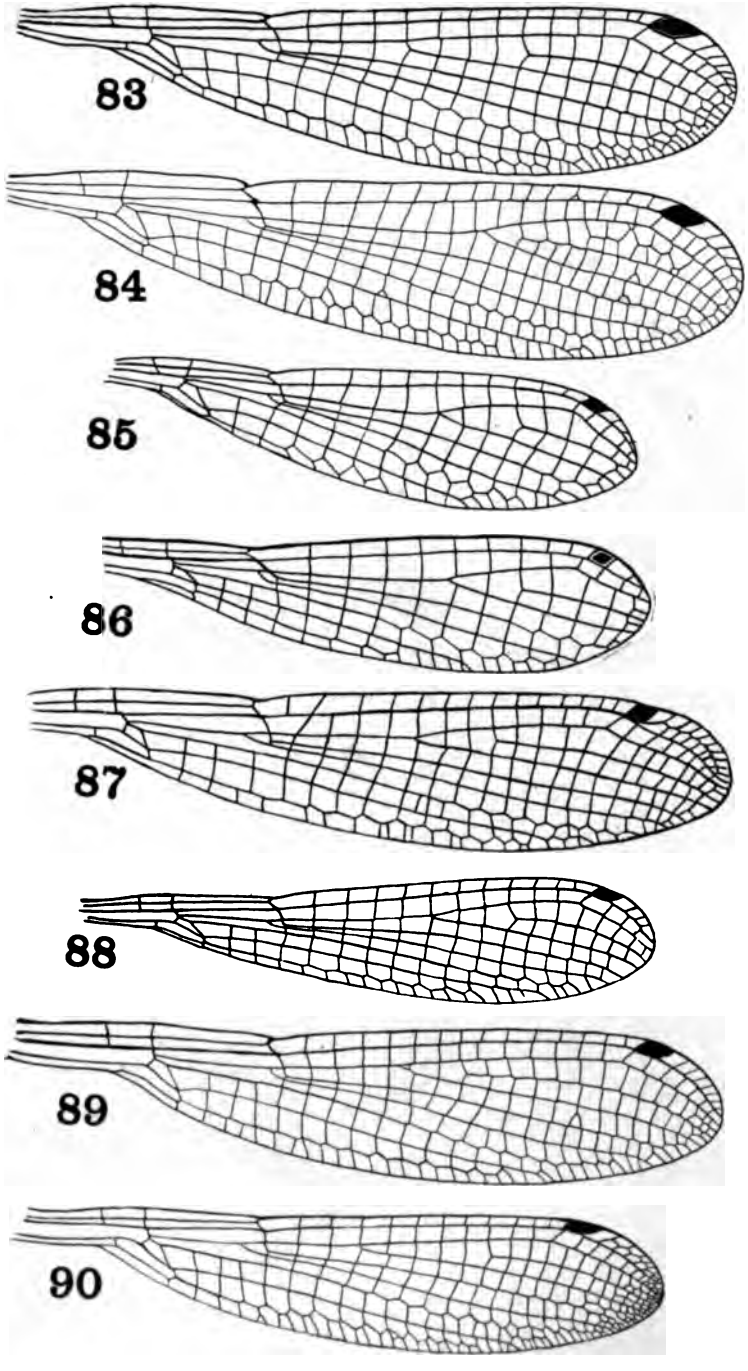

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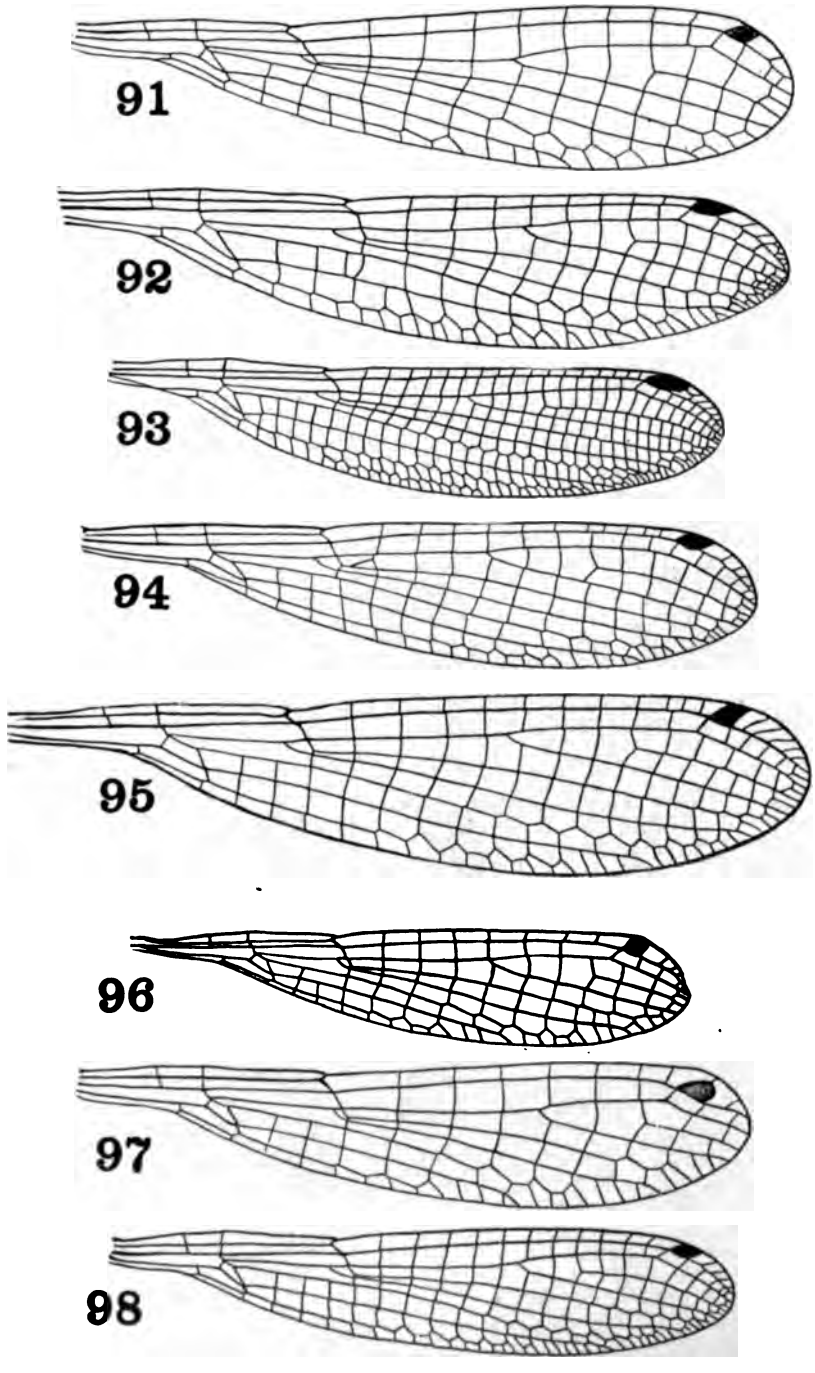

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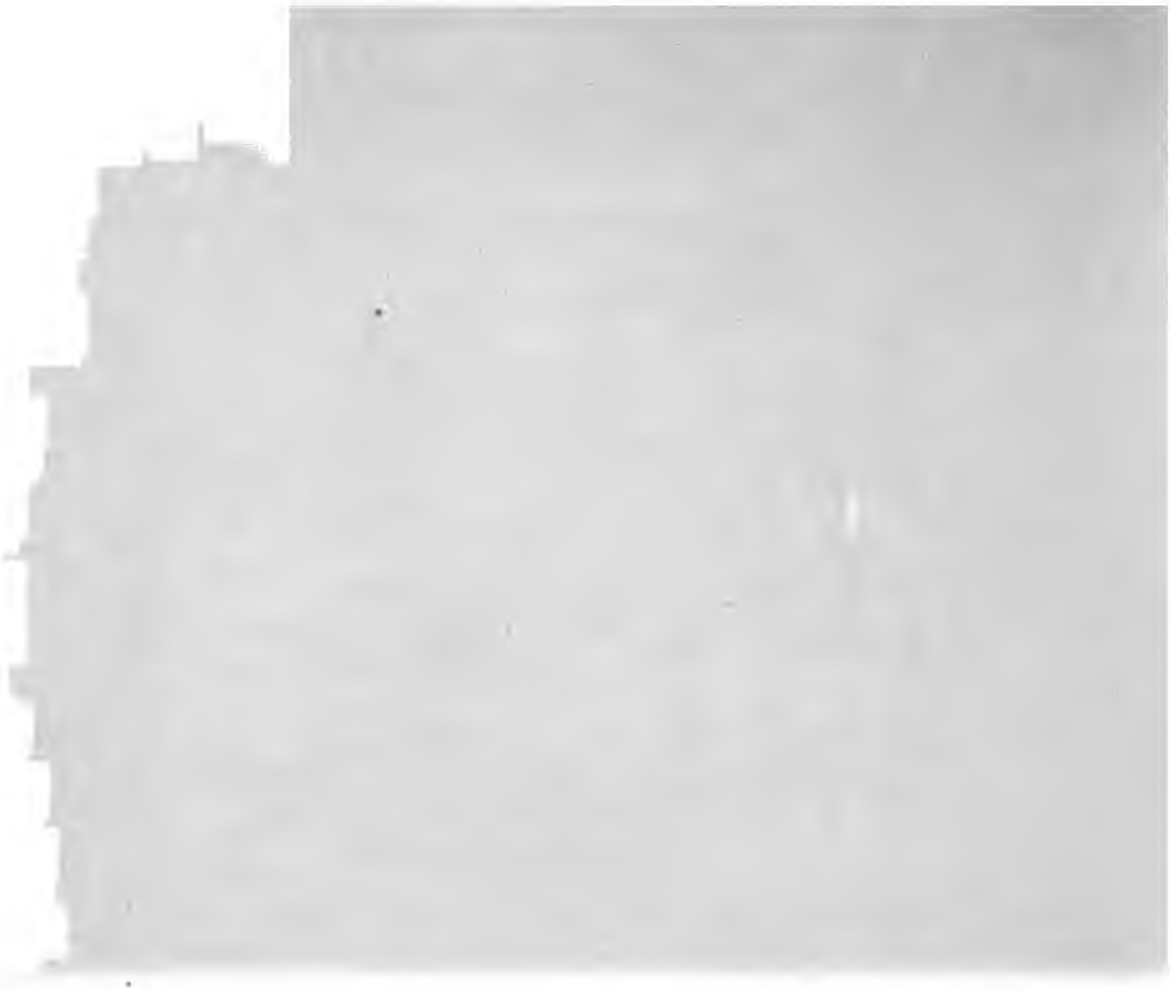

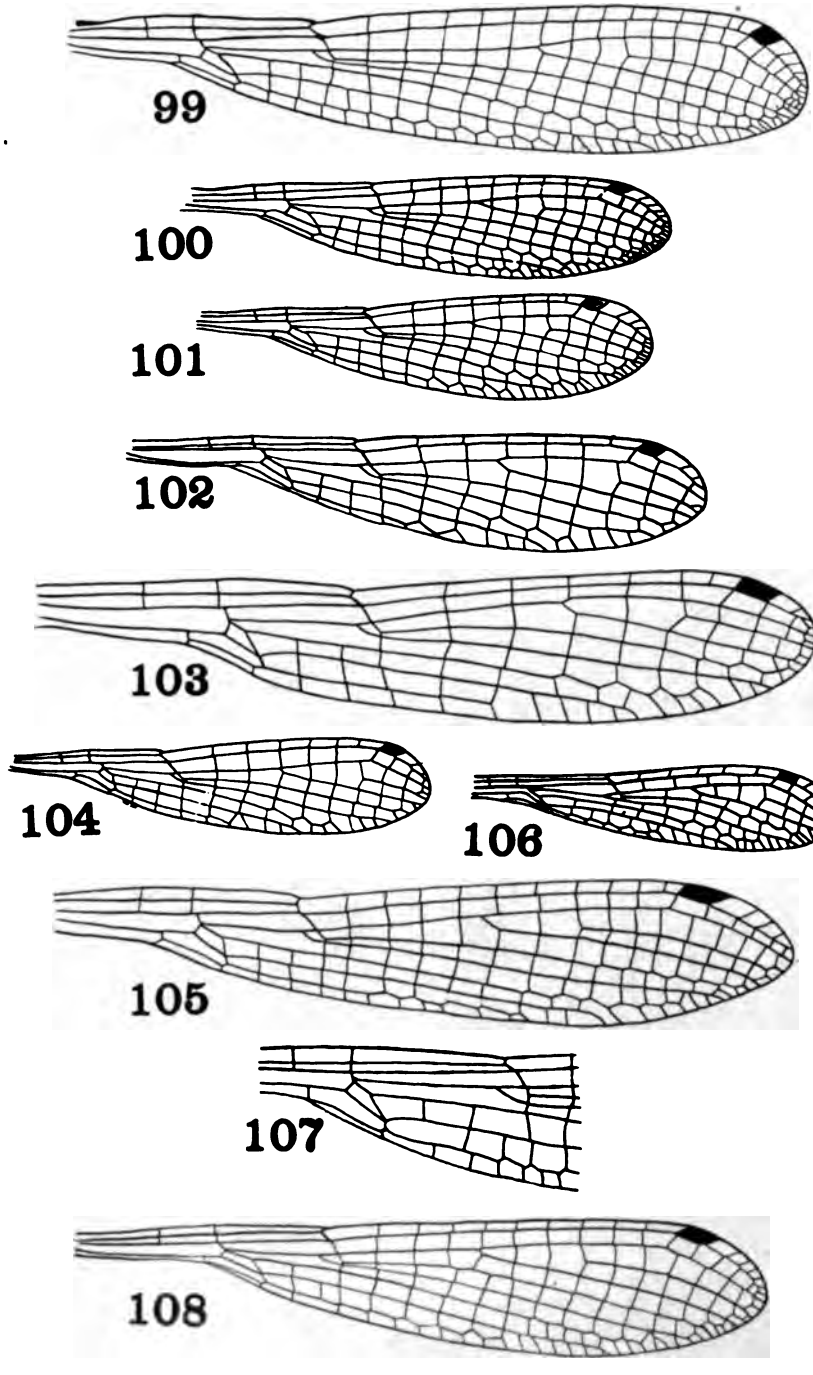

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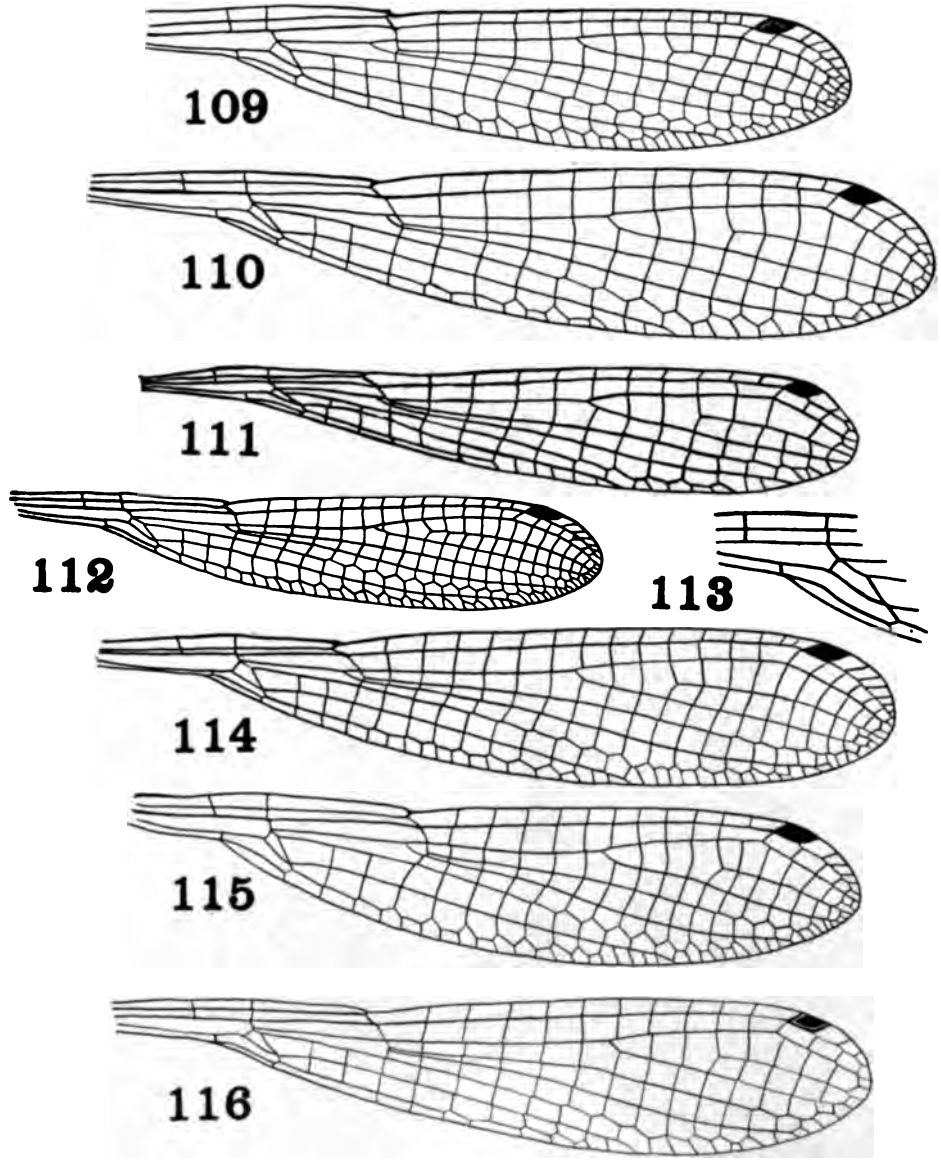

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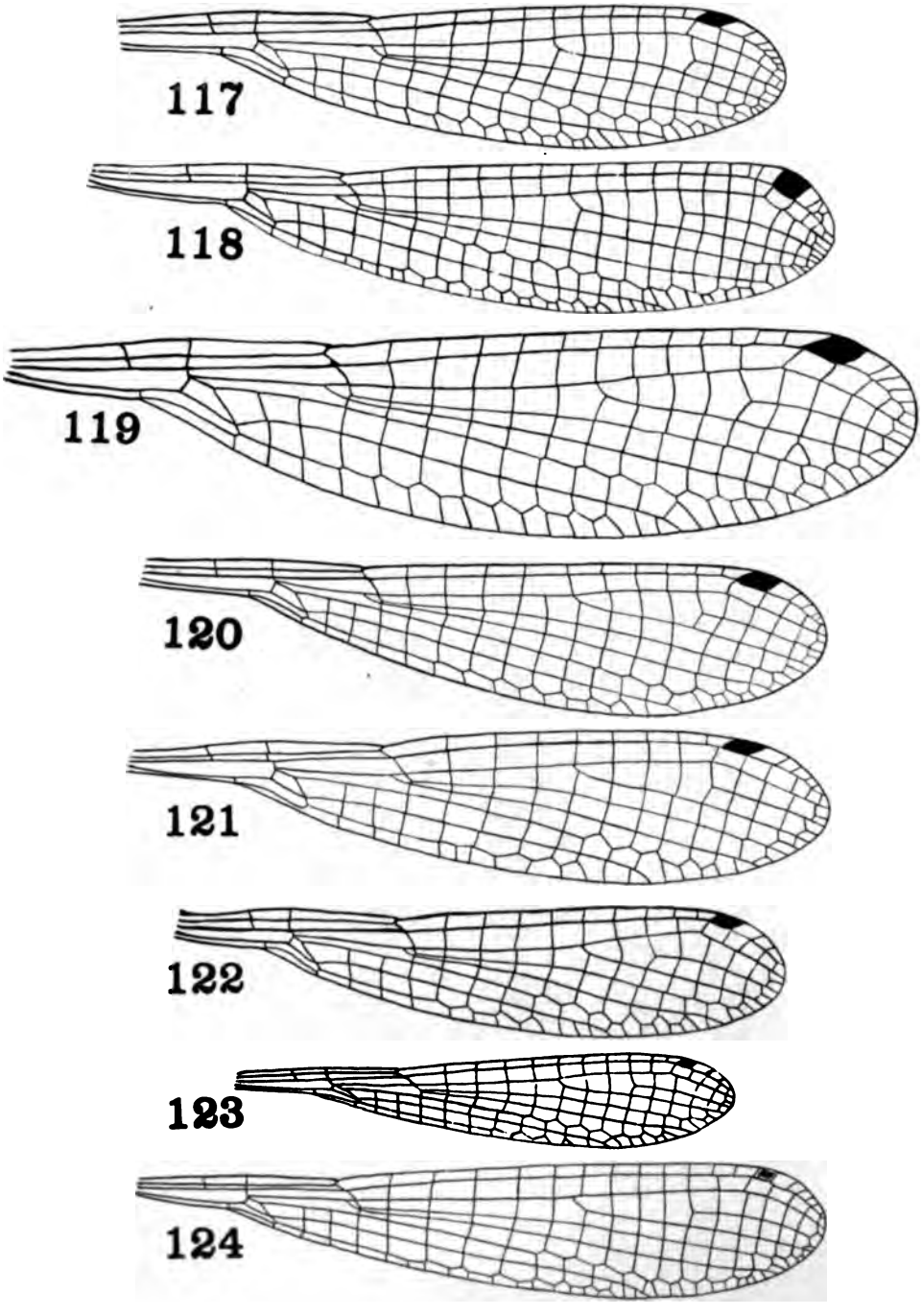

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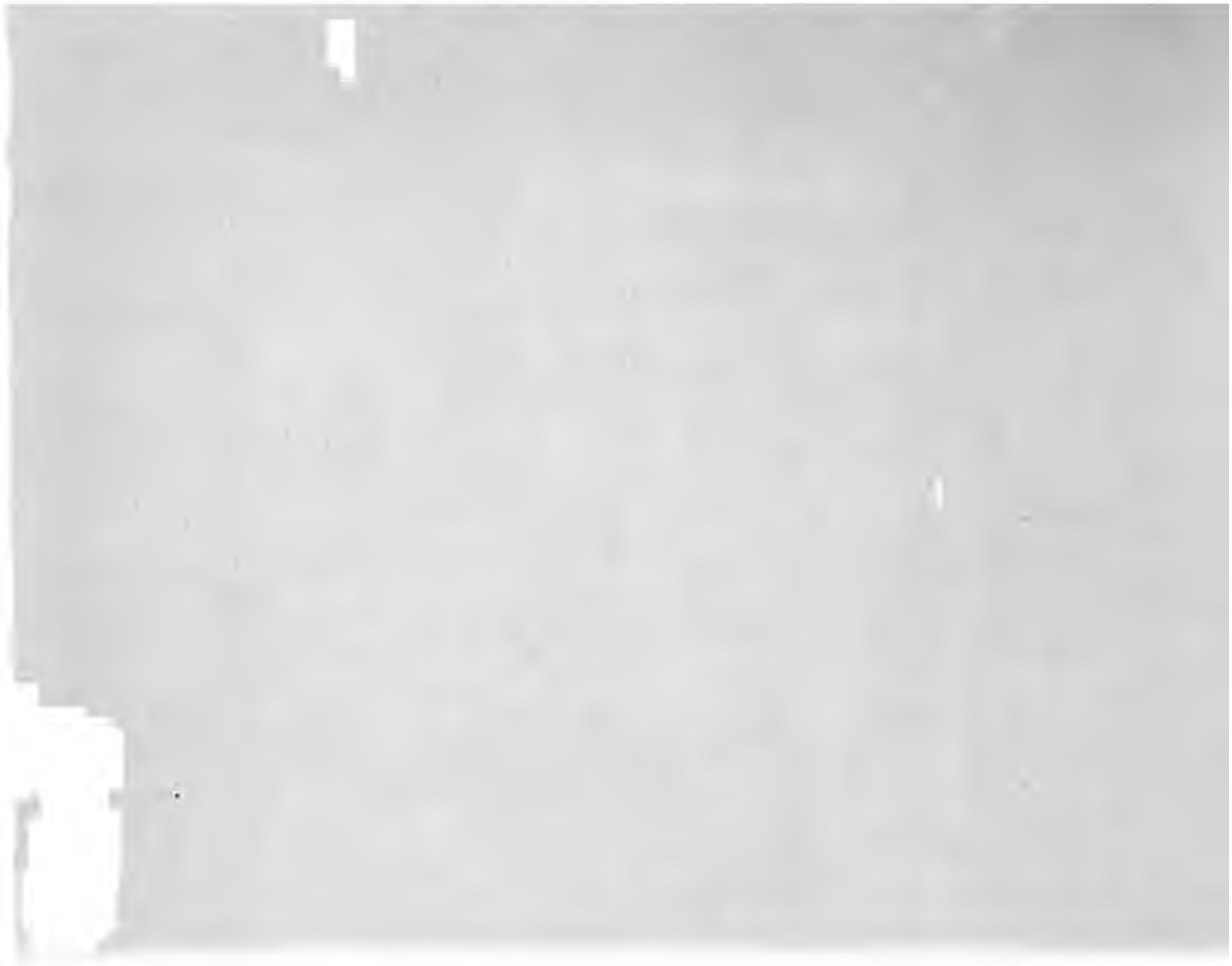

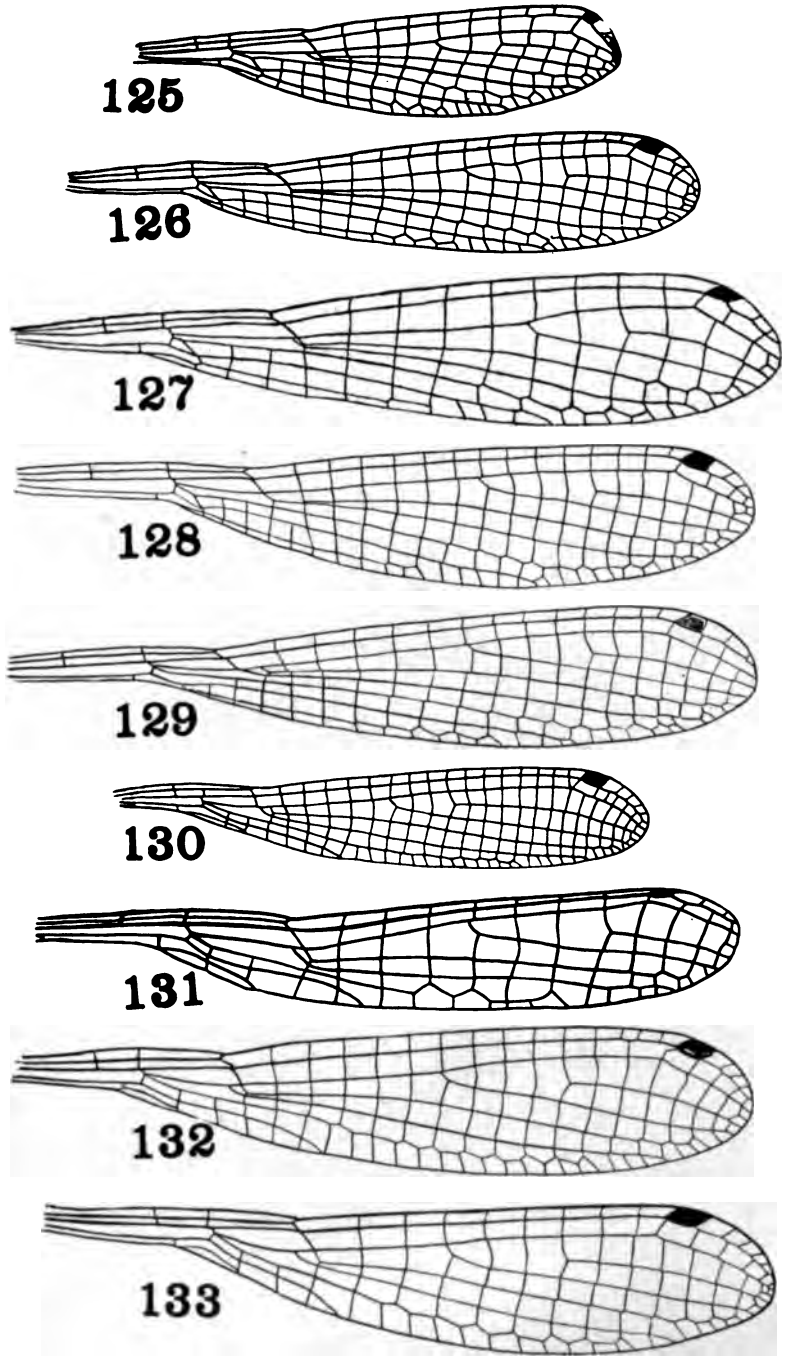

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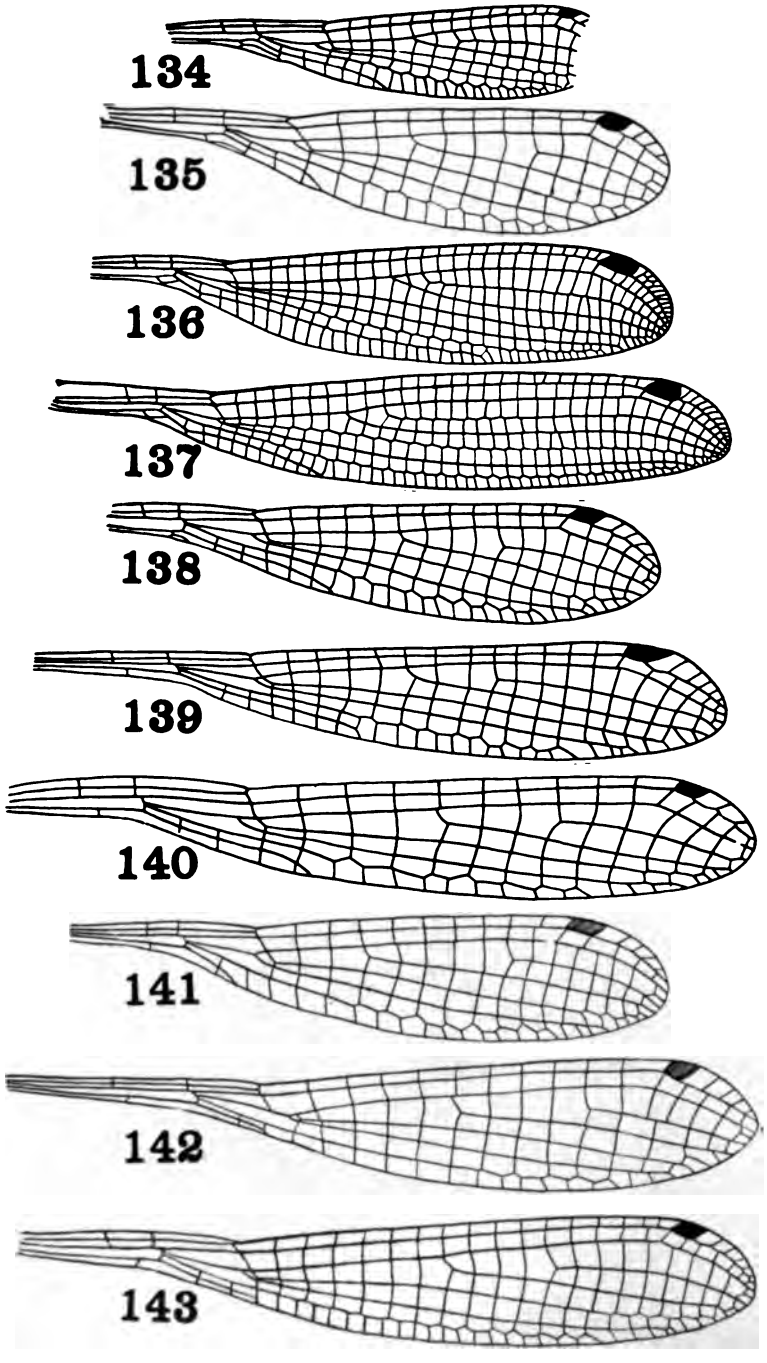

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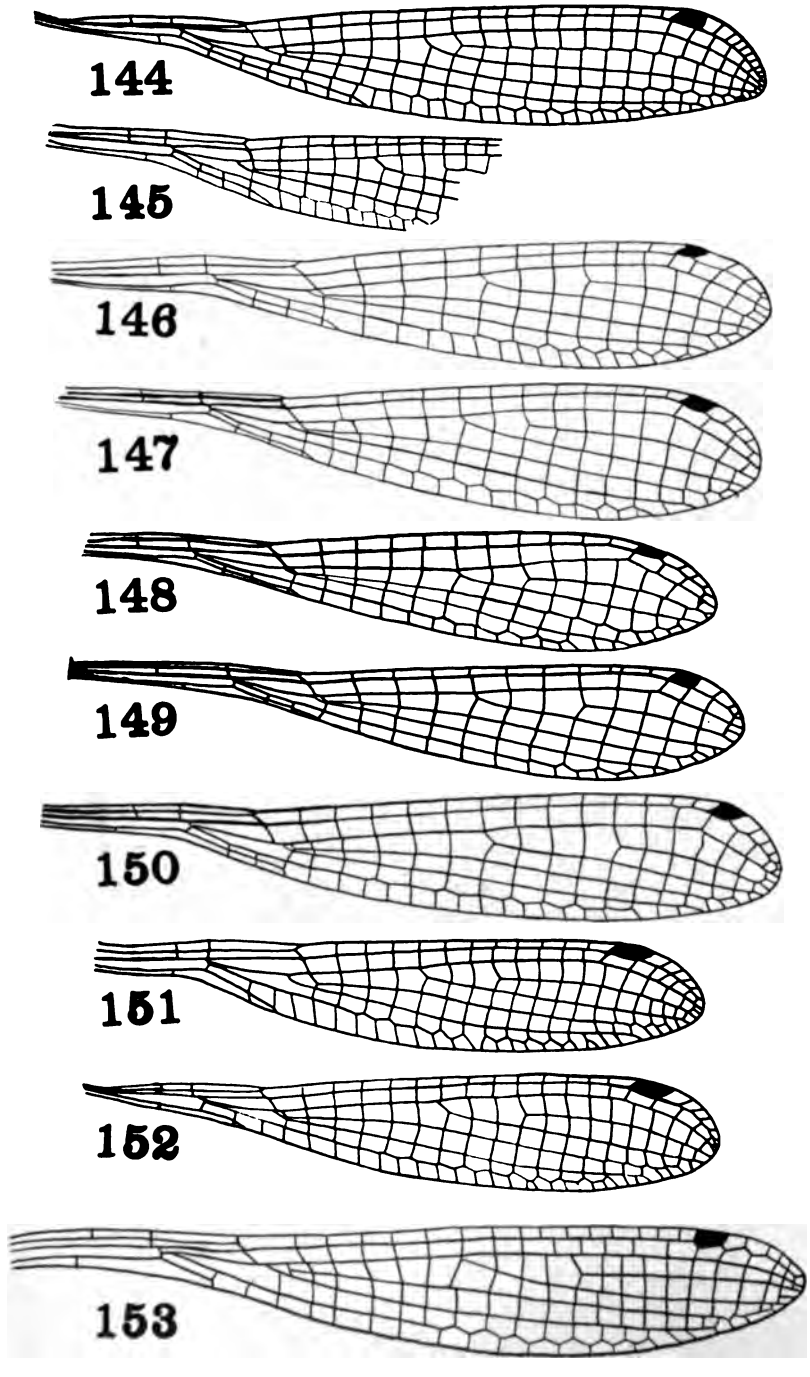

MUNZ—ZYGOPTERA VENATION

MEMOIRS
OF THE
AMERICAN ENTOMOLOGICAL SOCIETY
NUMBER 4

THE BLATTIDAE OF PANAMA

BY

MORGAN HEBARD

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THE BLATTIDAE OF PANAMA[1]

BY MORGAN HEBARD

During a brief visit made by the author to the Canal Zone, in November, 1913, a few hours' collecting secured a small but interesting series of Orthoptera. The Canal Zone, though not possessing the altitudinal differentiation found in the Greater Antilles, was at once seen to be much more productive than Jamaica, visited during the same trip. This is partly due to the latter region being further from the equator, but in much greater degree to its insular character. In summing up, the Canal Zone might, indeed, be said to be a compact and restricted area, excellent for a critical faunistic study, the mingling in that region of forms from both North and South America being a feature of particular interest.

When the meagerness of the literature bearing on Panamanian Orthoptera was noted,[2] efforts were at once concentrated on secur-

[1] The Dermaptera of Panama have already been studied and reported upon by Hebard (Trans. Am. Ent. Soc., xliii, pp. 301–334, (1917)). Thirty species were recorded, all but one of which were represented in the collections studied.

[2] In 1896, Griffini published two papers on Orthoptera from Panama (Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 232, pp. 1 to 32, and xi, no. 236, pp. 1 to 12), in which fifty-nine species were recorded, fifteen being described as new. The following year Giglio-Tos published an additional paper for this region (Boll. Mus. Zool. Anat. comp. Univ. Torino, xii, no. 301, pp. 1 to 9), recording thirty-seven more species, of which six were new.

In the Biologia Centrali-Americana (1893 to 1909) all previous records of Orthoptera from Panama were included, as well as the material assembled as a basis for that study. In that paper a total of two hundred and twenty-five species were recorded, fifty of these being described as new.

In addition to these papers, the literature was found to contain only scattered records and descriptions of Panamanian species.

ing sufficient material from the region to warrant publication of the data assembled. A visit to the United States National Museum developed that a very large and thorough collection had incidentally been made by men from that institution, and, through the kindness of Mr. A. N. Caudell, this material was put in our hands for study. For the small forms of the Blattidae, the excellent representation studied is largely from that series, collected principally by Mr. A. Busck. Considering the fact that he is a Microlepidopterist and not an Orthopterist, we take pleasure in congratulating him on the careful and thorough quality of his work. Further material was secured by the author from Mr. James Zetek, the total from that source being small, but containing some most interesting forms. Finally, in 1915, Mr. D. E. Harrower, who was going to the Canal Zone for Lepidoptera, volunteered to collect Orthoptera for the author as well. The series obtained by him was large and contained many additional forms.

As the total material collected is now much larger than has ever been assembled from one region in tropical America, it has been decided to undertake a complete summary, based on all available material from Panama, in America, with previous records and at present unrepresented species included in the tables on pages 6 to 9, to make the present work complete. The present paper, as a result, is a comprehensive summary of the Blattidae of the Canal Zone and vicinity.

The Canal Zone and vicinity, with localities indicated at which material studied in the present paper was taken, is shown in Plate I of the present paper.

We would remark that, in the Canal Zone and vicinity, lowland forests, marshes and limited open areas are the only types of country encountered, and that almost all of the material here studied, was taken in such environments. Very similar conditions are found in southern and eastern Costa Rica and in eastern Nicaragua to the north, and probably in northwestern Columbia to the south. Scarcely any work has, however, been done on the Orthoptera in those regions, but this, when accomplished, we feel certain will show a much wider distribution for many of the species here considered, which at present are known from comparatively limited areas on the Isthmus.

The higher country in the vicinity of Chiriqui to the west has a rich fauna, as is shown by the small collections made there for the Biologia Centrali-Americana. This fauna probably contains a great number of forms not found in the lowlands of Panama, many of which are probably the same as those found in the highlands of Cọsta Rica. In eastern Panama we believe that a different highland fauna will be encountered, showing the northernmost distribution of many of the mountain forest types which occur in northwestern Colombia.

The material here studied was assembled by the following individuals for the collections noted: by A. Busck, E. A. Schwarz, A. H. Jennings and W. Schaus for the United States National Museum, and by D. E. Harrower and the author, for the author's collection. Material was also taken by J. Zetek for both collections. We would note that in all cases Orthoptera was collected as a side issue, except by the author, whose efforts in Panama were limited to a few hours of field work. The tremendous number of species of Blattidae which occur in any one region in tropical America is well indicated when we consider these facts. We can hardly consider that more than a beginning has been made in studying the Blattidae of Panama. We have, however, had an opportunity to locate certain difficult genera, associate the widely different appearing sexes of certain species and obtain a better general understanding of the American subfamilies of the Blattidae.

Taxonomy

We have been able to observe certain features which we believe will be of considerable value in studying this difficult family. Consideration of the specialization of the dorsal surface of the male abdomen, supra-anal plate, concealed genitalia and subgenital plate and styles, which is found in many species, has proved to be a vital necessity. In the female sex the type of subgenital plate has also been often found to be extremely important, but usually of generic rather than specific value. The number and type of pulvilli, armament of the ventral surface of the tarsi and development of the arolium has proved to be useful in many ways, while the asymmetry or specialization of the tarsal claws are features of importance. Many of these characters have been casually con-

sidered or wholly overlooked in the past. We feel certain that the difficulty in studying so large and complex a family will be greatly lessened if they are properly considered in future work.

We would note the following features for the genera studied, or compared, in the preparation of the present paper.

Dorsal surface of male abdomen specialized in *Ceratinoptera*, *Dendroblatta*, *Eudromiella*, *Latiblattella*, *Antitheton*, *Rhytidometopum*, *Supella*, the Nahua Group of *Neoblattella*, *Blattella*, *Ischnoptera*, *Xestoblatta*, *Parcoblatta*, *Euphyllodromia*, *Pseudophyllodromia* (Pseudomopinae); *Chorisoneura* [weakly] and *Plectoptera* [weakly] (Oxyhaloinae).

Female subgenital plate valvular in *Anaplecta* (Ectobiinae); all known genera of the Blattinae; *Holocompsa*, *Hypercompsa*, *Latindia*, *Compsodes*, *Melestora* and *Buboblatta* (Corydiinae): with a medio-longitudinal cleft distad in *Lissoblatta* (Ectobiinae); *Euphyllodromia* [strongly] (Pseudomopinae), and *Chorisoneura* (Oxyhaloinae).

Tarsal claws asymmetrical in *Ectobius*, *Eutheganopteryx*, *Phyllodromica*, *Lissoblatta* (Ectobiinae); *Latiblattella*, *Antitheton* (Pseudomopinae); all genera except *Megaloblatta* of the Nyctiborinae, and *Chorisoneura* (Oxyhaloinae): specialized in *Chorisoblatta* (Ectobiinae); *Neoblattella*, *Cariblatta*, *Lophometopum* (Pseudomopinae), and *Plectoptera* (Oxyhaloinae).

We feel more than ever satisfied that it will be impossible to separate the subfamilies of the Blattidae by a few definite and readily discernible features. We have found a valvular female subgenital plate in several subfamilies besides the Blattinae, though this was supposed to be characteristic of that subfamily. The tarsal claws are asymmetrical in all the genera of the Nyctiborinae except *Megaloblatta*, but this feature appears in a number of genera clearly belonging to other subfamilies. The hooded pronotum, characteristic of almost all forms of the Perisphaerinae, is very weakly indicated, particularly in the male sex, in *Colapteroblatta*, a genus belonging to that subfamily, though we feel no doubt as to the proper assignment of this genus. The ulnar vein without branches, once supposed to separate definitely all of the Ectobiinae, was correctly determined by Shelford to have exceptions in that subfamily and to be a feature occasionally met with

elsewhere, while the transverse supra-anal plate, for a time given as characteristic of that subfamily, is also worthless for any such purpose. Indeed, certain species of the Oxyhaloid genus *Chorisoneura* have a strongly transverse supra-anal plate, while others have the supra-anal plate triangularly produced. Thus we are forced to the conclusion that a general facies, produced by a combination of subtle characters, will be found the criterion for placing genera in their proper subfamilies. In most cases this is not a difficult matter to the experienced student. A Nyctiborine, Panchlorine, Blaberine or other subfamily facies is readily noted. In some groups, however, and usually among those showing adaptation to peculiar modes of living, particularly through atrophy of tegmina, wings and limb armament, such assignment may prove to be extremely difficult. We have not been able to assign such genera as *Hyporhicnoda*, *Pycnosceloides*, *Colapteroblatta* and *Litopeltis* without long continued study and comparison with all the genera which exhibited resemblance of any kind. In regard to *Anaplecta*, we feel no hesitancy in placing the genus in the Ectobiinae, particularly after finding that the genus *Lissoblatta*, though of close general similarity to *Anaplecta*, showed a number of characters agreeing instead with *Ectobius* and its nearer allies.

As to *Chorisoneura* and *Plectoptera*, the unarmed ventral femoral margins lead us to the conclusion that it is best to assign these genera to the Oxyhaloinae. Both are distinctive and widely separated from any other known genera, both in different ways show many indications of apparent approach to the *Anaplecta*, and particularly to the *Lissoblatta*, type. Whether this is convergence toward that section of the Ectobiinae, or indicates common ancestry, we are unable to state. We do feel, however, that until much more work is done in the Blattidae, these genera had best be left in the Oxyhaloinae.

The large unworked collections, frequently referred to while studying the present material, show that a mere beginning has been made on a modern classification of the Blattidae of tropical America. The multitude of as yet undescribed genera and species, when studied, will undoubtedly throw much light on many of the problems which at present can hardly be solved.

We wish to thank most heartily Mr. A. N. Caudell of the United States National Museum for the opportunity to study the material belonging to that institution, and Mr. James A. G. Rehn, whose unceasing energy has now built up an extremely extensive determined collection at the Academy of Natural Sciences of Philadelphia, invaluable for reference in studies such as the present.

In the present paper eight hundred and ninety-four Panamanian specimens are treated, representing forty-seven genera and ninety-three species and races, of which ten genera and thirty-seven species are described as new.

From the literature we find that ten additional species have been recorded from Panama, bringing the total of genera and species known from that region to fifty-three genera and one hundred and three species. These species are tabulated below, their known distribution in North America, Panama, South America and the West Indies being indicated by asterisks, those having close affinity to other species occurring in the area checked being indicated by an "a".

We would remark that but two species, not including those generally distributed through all or the greater portion of tropical America, are also found in the West Indies, that forty-nine are known only from Panama, twenty-five from Panama and northward, nine from Panama southward and eighteen from Panama and North and South America. Two species are known from North and South America but have not yet been found in Panama.

Though we find the influence from North America stronger than from South America in the Canal Zone, we do not believe it to be as much greater as is indicated by the above figures, considering that a much greater amount of work has been done in Central America than in northern South America.

Species	North America	Panama	South America	West Indies
ECTOBIINAE				
Lissoblatta fulgida	*	*	—	—
Lissoblatta flabellata	*	*	—	—
Anaplecta lateralis	—	*	*	—
Anaplecta asema	*	*	—	—
Anaplecta sordida	—	*	—	—
Anaplecta gemma	—	*	—	—
Anaplecta hemiscotia	—	*	—	—
Anaplecta cabimae	—	*	—	—

Species	North America	Panama	South America	West Indies
PSEUDOMOPINAE				
Euthlastoblatta compsa	—	*	—	—
Ceratinoptera picta	*	*	*	—
Dendroblatta sobrina	*	*	*	—
Aglaopteryx lita	a	*	—	a
Eudromiella bicolorata	—	*	—	—
Latiblattella inornata	a	*	—	—
Latiblattella angustifrons	a	*	—	—
Macrophyllodromia splendida	a	*	—	—
Chromatonotus heterus	—	*	a	a
Chromatonotus lamprus	—	*	a	a
Rhytidometopum megalopterum	—	*	—	—
Supella supellectilium	*	*	*	*
Cariblatta imitans	a	*	a	a
Neoblattella fratercula	*	*	—	—
Neoblattella acanthastylata	—	*	—	—
Neoblattella panamae	—	*	—	—
Neoblattella impar	—	*	—	—
Neoblattella chagrensis	—	*	—	—
Neoblattella nahua	*	*	—	—
Neoblattella fraterna	*	*	—	—
Lophometopum leptum	—	*	—	—
Blattella germanica	*	*	*	*
Ischnoptera nox	—	*	a	—
Ischnoptera rufa rufa	—	*	*	*
Ischnoptera rufa occidentalis	*	*	—	—
Ischnoptera gatunae	—	*	—	—
Ischnoptera bergrothi	*	*	—	—
Ischnoptera inca	*	*	—	—
Ischnoptera mirella	—	*	—	—
Ischnoptera panamae	—	*	—	—
Xestoblatta festae	—	*	—	—
Xestoblatta immaculata	—	*	—	—
Euphyllodromia angustata	*	*	—	—
Euphyllodromia decastigmata	—	*	—	—
Pseudomops aurantiaca[3]	—	*	—	—
Pseudomops gloriosa	a	*	—	—

[3] Kirby has placed this name in the synonymy under *Pseudomops deceptura* Walker, described from Pará, Brazil. Examination of the types, we believe, will show these species to be closely related but distinct.

Species	North America	Panama	South America	West Indies
NYCTIBORINAE				
Nyctibora noctivaga	*	*	—	*
Eunyctibora nigrocincta	—	*	*	—
Paratropes biolleyi	*	*	*	—
Paratropes bilunata	*	*	—	—
Paratropes pinoganae	—	*	—	—
Megaloblatta blaberoides	*	*	a	—
EPILAMPRINAE				
Calolampra brevitarsis	—	*	—	—
Audreia bromeliadarum	—	*	—	—
Audreia gatunae	—	*	—	—
Epilampra azteca	*	*	—	—
Epilampra maya	*	*	—	—
Epilampra colombiana	*	*	*	—
Epilampra mexicana	*	*	—	—
Epilampra conspersa	*	*	*	—
Hyporhicnoda reflexa	*	*	—	—
BLATTINAE				
Lamproblatta albipalpus	—	*	*	—
Pelmatosilpha rotundata	—	*	—	—
Pelmatosilpha villana	—	*	—	—
Eurycotis biolleyi	*	*	—	—
Eurycotis pluto	—	*	—	—
Neostylopyga rhombifolia	*	—	*	—
Blatta orientalis	*	—	*	*
Periplaneta americana	*	*	*	*
Periplaneta brunnea	*	*	*	—
Periplaneta australasiae	*	*	*	*
PANCHLORINAE				
Leucophaea maderae	*	*	*	*
Pycnoscelus surinamensis	*	*	*	*
Pycnosceloides aporus	*	*	—	—
Panchlora cubensis	*	*	*	*
Panchlora exoleta	—	*	*	—
Panchlora colombiae	—	*	*	—
Panchlora minor	*	*	—	—
Panchlora translucida	*	*	—	—
Panchlora cribrosa	—	*	—	—
Achroblatta luteola	*	*	*	—
Phortioeca phoraspoides	*	*	—	—
Capucinella delicatula	—	*	*	—

Species	North America	Panama	South America	West Indies
BLABERINAE				
Archimandrita tessellata	*	*	*	—
Blaberus colosseus	*	*	*	—
Blaberus discoidalis	—	*	*	*
Eublaberus biolleyi	*	*	—	—
Eublaberus posticus	—	*	*	—
Cacoblatta scabra	—	*	—	—
CORYDIINAE				
Holocompsa nitidula	*	*	*	*
Holocompsa panamae	—	*	—	—
Hypercompsa fieberi	—	*	*	—
Latindia dohrniana	*	*	—	—
Compsodes cucullatus	*	*	—	—
Melestora micra	—	*	—	—
Buboblatta armata	—	*	—	—
OXYHALOINAE				
Calhypnorna amoena	—	*	—	—
Calhypnorna pulchella	—	*	—	—
Chorisoneura parishi	—	*	*	—
Chorisoneura panamae	—	*	—	—
Chorisoneura fuscipennis	—	*	—	—
Chorisoneura translucida	*	*	*	—
Chorisoneura cabimae	—	*	—	—
Chorisoneura specilliger	—	*	—	—
Chorisoneura gemmicula	—	*	—	—
Plectoptera pulicaria	—	*	—	—
PERISPHAERINAE				
Litopeltis bispinosa	—	*	—	—

There are in addition a number of species recorded from both North and South America, but in all cases we feel that there is considerable uncertainty as to whether one and the same species is represented.

The following records from Panama we have reason to believe to be incorrect.

1896. *B[latta] vitrea* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 1. [♂, Darien.]

This record is probably applicable to a species of *Latiblattella*, probably *inornata* or *angustifrons*, described in the present paper.

We believe that the southward distribution of *Latiblattella vitrea* (Brunner) will be found to fall far short of Panama.

1896. *B[latta] acolhua* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 1. [One specimen; Punta di Sabana, Darien.]

We believe that this specimen is referable to *Neoblattella fraterna* (Saussure and Zehntner). The opaque lateral portions of the pronotum noted, may be due to the specimen having been preserved in alcohol.

1889. *Nyctibora? holosericea?* Bruner, Proc. U. S. Nat. Mus., xii, p. 188. [Juv., Panama.]

1914. *Nyctibora brunnea* Caudell, Insec. Inscit. Menst., ii, p. 77. [Juv. ♀; Porto Bello, Panama.]

This material is almost certainly incorrectly identified. It may represent *Nyctibora noctivaga* Rehn or a smaller species of the genus, which we know to occur in Panama, but of which at the present time insufficient material is at hand for proper determination.

SYSTEMATIC TREATMENT

Subfamily ECTOBIINAE

LISSOBLATTA[4] new genus

The present genus is erected for two species which have been placed in *Anaplecta*. The oblique discoidal sectors of the tegmina and asymmetrical tarsal claws distinguish the species of the present genus, which differ further from those of *Anaplecta* in having a different type of subgenital plate in the female, and in having more ample pulvilli in both sexes. In the genotype the form is heavier and the tegmina and wings are broader than in the majority of the species of *Anaplecta*, though in the Elliptica Group a similar facies is found. The general appearance is decidedly Plectopterine.

GENOTYPE: *Lissoblatta fulgida* (*A* [*naplecta*] *fulgida*) (Saussure).

Generic Description. Size moderately large for the group; form stout, elliptical; smooth, shining. Head longer than broad (not

[4] From λισσός = smooth. The smooth roach.

as much so as in the majority of species of *Anaplecta*) ocellar areas very feebly defined; ocellar spots very weak. Pronotum convex, without trace of discal sulci or depressions. Tegmina broad; costal margin convex to the rather sharply rounded apex: discoidal sectors oblique (see plate II, fig. 1). Wings broad; medio-discoidal area with numerous transverse veinlets, but no distal longitudinal veinlet. Male subgenital plate and appendages highly specialized (in some respects annectant between the general character of the types found in *Anaplecta* and in *Plectoptera*). Female subgenital plate convex distad with a deep medio-longitudinal linear cleft (not valvular as in *Anaplecta* or simple but strongly truncate distad as in *Plectoptera*).

Cephalic femora with ventro-cephalic margin armed with a long row of closely set, short, microscopic, piliform spines, terminating in two elongate distal spines, of which the more distal is slightly the longer; ventro-caudal margin supplied with a few stiff elongate hairs and (from none to two) elongate spines and distad with a single elongate spine. Median and caudal femora with ventral margins supplied with a few stiff elongate hairs and (one to four, the greater number always on the cephalic margin) elongate spines, all with a single elongate distal spine. Caudal tarsi with fourth joint alone supplied with and ventral surface fully occupied by a large pulvillus. Tarsal claws asymmetrical. Arolia large.

In addition to the genotype, we find *flabellata* (Saussure and Zehntner) to be a member of the present genus.

Lissoblatta fulgida (Saussure) (Plate II, figures 1 and 2.)

1862. *A[naplecta] fulgida* Saussure, Rev. et Mag. Zool., (2), xiv, p. 163. [Guatemala.]

1893. *Anaplecta jansoni* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 29., pl. iii, fig. 4, pl. iv, figs. 9 and 16. [Chontales, Nicaragua.]

Porto Bello, Panama, II, 15 and III, 15, 1911, (Busck), 1 ♂, 1 juv. ♂, (juv. ♂, dark).

Rio Trinidad, Pan., V, 7, 1911, (Busck; on *Citrus*), 1 ♀, (dark), 2 juv. ♀.

Bohio, Canal Zone, Pan., II, 7, 1911, (Schwarz), 1 ♀, (dark).

Paraiso, C. Z., Pan., I. 14 to IV, 14, 1911, (Schwarz), 2 ♂, 4 ♀, (1 ♂, 3 ♀, dark; 1 ♀, dark with banded tegmina).

Panama, Pan., VI, 1915, (Harrower), 1 ♂, (moderately dark).

Calidoma Road, Pan., IV, 12, 1911, (Jennings), 1 ♂, 1 ♀, 1 juv., (all pale).

The series at hand shows conclusively that *jansoni* is merely a dark color phase of the present species, unworthy of nominal recognition.

Color.—In the present material four males, one female and one immature are shining hazel in general coloration. Of these, several are less reddish than the others, approaching ochraceous-tawny. All but one of the remaining specimens are darker, shining chestnut in general coloration, with one individual alone having the underparts as pale as in the light examples.

A single female is shining burnt sienna in general coloration, with tegmina distinctively marked proximad and mesad with moderately broad transverse bands of blackish brown, of which the median band is the wider.

The value of these color features would be more difficult to determine were it not known that similar and fully as remarkable color differences occur in the allied *L. flabellata*. Moreover, in the present series, other less noticeable but far more important features of coloration are common to all individuals. Those particularly noteworthy are: the maxillary palpi which are pale, with distal half of fourth and entire fifth joint very dark blackish; the pale antennae, spines of the limbs and tarsal joints. The color of the cerci, however, varies in accord with the individual general coloration.

Structure.—In the present insect the styles of the male subgenital plate are asymmetrical: the sinistral small and ovoid, situated on the dorsal surface of the plate at the margin and directed dorsad; immediately dextrad is situated a smaller dark chitinous projection directed caudad, with thorn-like distal portion curving ventrad; the margin between this process and the dextral style is weakly produced; dextral style nearly three times as long as sinistral, broader at base, tapering gently to the rounded apex, situated on the free margin and directed mesad along that margin.

Ootheca.—One female is at hand with ootheca partially extruded, carried horizontal. The ootheca has the suture supplied with rather widely spaced minute nodes, while a well-developed longitudinal carina is situated on each side about one-third the distance from the suture to the ventral margin.

Lissoblatta flabellata (Saussure and Zehntner)

1893. *Anaplecta flabellata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 29, pl. iii, fig. 1, pl. iv, figs. 13 and 14. [♂, ♀: Teapa, Tabasco, Mexico; Chacoj, Vera Paz, Guatemala; Bugaba, Panama.]

Porto Bello, Panama, III, 10 and 13; 1911, (Schwarz, Busck), 2 ♀.
Paraiso, Canal Zone, Pan., I, 20 and II, 6, 1911, (Schwarz), 1 ♂, 1 ♀.

Color.—The present specimens have immaculate tegmina. A Guatemalan series of twenty-four specimens, at hand, shows all the transitions from this type to the one having the tegmina heavily marked with two distinct transverse dark nebulous bands. This variation was also noted by the original authors.

Ootheca.—A female, with ootheca slightly less extruded than in the specimen of *L. fulgida* discussed, is before us. In the present case the suture is dorsad. The structure of the ootheca is very similar in these two species. The position in which the ootheca is carried would, from this evidence, again appear to have little or no significance in systematic work in the Blattidae.[5]

ANAPLECTA Burmeister

1838. *Anaplecta* Burmeister, Handb. Ent., ii, abth. ii, pt. 1, p. 494.

GENOTYPE: *Anaplecta lateralis* Burmeister, selected by Kirby, 1904.[6]

The present genus, from the determined and undetermined material at hand, is seen to be one of the largest of the Blattidae. A great number of species apparently fall into the Lateralis Group, including very small forms, uniform and dark in coloration, with pronotum laterad and tegmina latero-proximad narrowly margined with whitish or buffy. That this group may require further division is shown by the fact that some of the species have comparatively simply developed appendages of the male subgenital plate, while in others these appendages are highly specialized. In addition, the wing development and venation shows some differentiation in certain forms. The difficulty of group assignment is increased by finding certain species of wholly different coloration, such as *A. asema* and *A. sordida* here described, which in structural features show nearest relationship to forms having the characteristic coloration of this group.

[5] See Hebard, Mem. Am. Ent. Soc., 2, p. 55 and p. 146, (1917).
[6] Syn. Cat. Orth., i, p. 66.

The species having two striking longitudinal markings on the pronotum appear to be assignable to the Bivittata Group, these are more elongate and usually decidedly larger than the species of the Lateralis Group. Here again similar difficulty in delimiting the unit occurs, the pronotal markings being sometimes fused to different degrees, as in *A. hemiscotia* here described, or absent, as in *A. gemma* here described, structural features again obliging us to place these species with others which agree more closely in striking features of color pattern.

Still other species, such as *A. dohrniana* Saussure and Zehntner, and *A. cabimae* here described, clearly represent other distinctive and widely separated groups.

We feel satisfied that revision of the genus will show it to be comparatively homogeneous for so large a unit, but composed of a number of readily recognizable groups. This is one of the few genera of the Blattidae, which does not include domiciliary forms, found both in Africa and America.

The following features of limb armament we find characteristic of *Anaplecta*. Cephalic femora with ventro-cephalic margin armed with a long row of moderately closely placed, short, microscopic, piliform spines, terminating in two elongate distal spines, of which the more distal is slightly the longer; ventro-caudal margin supplied with a few stiff elongate hairs and (none to four) elongate spines, distad with or without a single elongate distal spine. Median and caudal femora with ventral margins supplied with a few stiff elongate hairs and elongate spines (one to four, the greater number always on the cephalic margin), all with a single elongate distal spine. Caudal tarsi without pulvilli, or with ventral surface of very small fourth joint alone fully occupied by a pulvillus. Arolia vestigial in species lacking pulvillus, moderately large in other species.

Key to the Panamanian Species of Anaplecta

This key is not of any diagnostic importance; it is given merely as a guide to the species here considered.

(Medio-discoidal area of wings with a distal longitudinal veinlet in all but *A. cabimae*.)

A. Disk of pronotum unicolorous, tegmina immaculate.

B. Disk of pronotum and tegmina blackish brown.

C. Tegmina with costal margin narrowly but distinctly whitish. **lateralis** Burmeister

CC. Tegmina blackish brown with marginal field only slightly paler. **sordida** new species

BB. Disk of pronotum and tegmina pale, ochraceous.

C. Size larger, form moderately slender.....**asema** new species

CC. Size smaller, form less slender, *Plectoptera*-like....**cabimae** new species

AA. Disk of pronotum with two longitudinal dark bands or with tegmina strikingly maculate.

B. Disk of pronotum moderately pale, with two indistinct longitudinal dark suffusions. Tegmina ochraceous with a small, sharply defined, nearly rectangular marking of blackish brown proximad in the discoidal field....**gemma** new species

BB. Disk of pronotum pale, (normally) with two striking longitudinal dark bands. Tegmina with the dark brown of the anal and discoidal fields gradually fading into the ochraceous of the inner margin of the discoidal field and remaining portions.....**hemiscotia** new species

Anaplecta lateralis Burmeister (Plate II, figures 3 and 4.)

1838. *A[naplecta] lateralis* Burmeister, Handb. Ent., ii, abth. ii, pt. 1, p. 494. [Colombia.]

Porto Bello, Panama, IV, 17 and 21, 1911, (Busck), 6 ♂, 1 ♀.

Gatun, Canal Zone, Pan., VII, 17 to 23, 1916, (Harrower), 1 ♀.

Alhajuela, Pan., III, 6 to IV, 19, 1911 and 1912, (Busck), 1 ♂, 2 ♀.

Rio Trinidad, Pan., V, 2 to VI, 6, 1911 and 1912, (Busck), 16 ♂, 17 ♀.

Tabernilla, C. Z., Pan., V, 7 to VI, 14, 1907, (Busck), 11 ♂, 22 ♀.

Cabima, Pan., V, 20 and 22, 1911, (Busck), 2 ♀.

Corozal, C. Z., Pan., IV, 27, 1911, (Busck), 1 ♂.

Old Panama, Pan., XI, 13, 1913, (Hebard; under drift on edge of coral sand beach), 2 ♀.

Chorrera, Pan., V, 17, 1912, (Busck), 1 ♀.

To the present species Saussure's *A. fallax* shows nearest relationship, of which species a series is before us representing localities from Mexico to Costa Rica.

That the Lateralis Group is large and includes many species superficially very similar, is well demonstrated by numerous Central and South American examples before us. The male genitalia, though not widely differing in some of the species, we believe afford in themselves diagnostic differences for all the species of this group.

Little variation is noted in the large series of the present species at hand. The tegmina in all extend slightly beyond the apex of the abdomen, if the abdominal segments are in normal position.

The length from occiput to apex of tegmina ranges in the series from 5 to 5.8 mm., the smallest examples being males. The body length averages 4.5 mm. in the males, 5 mm. in the females. This agrees with Brunner's diagnosis of what he believed to be the female type, but is larger than the dimension given that specimen by Burmeister. In general coloration the great majority are shining blackish brown, the remainder vary to as light as amber brown. These paler examples may very possibly have been captured before they had fully hardened and consequently before they had reached their normal adult depth of coloration.

In the present species the costal veins are distinctly clubbed distad; this is not true of the closely related *A. fallax*.

Ootheca.—One female is at hand with ootheca almost fully extruded, carried with suture dorsad. This ootheca closely resembles that discussed under *A. hemiscotia*, here described, differing only in having the suture even higher, its height equalling nearly half the distance from its base to the ventral margin, and with dorsal surface of suture more finely sculptured in similar fashion. It will be noted that this is a type of ootheca very widely distinct from that of *Lissoblatta fulgida* (Saussure).

Anaplecta asema[7] new species (Plate II, figure 5).

Apparently related to *A. azteca* Saussure,[8] differing in the cephalic coloration, tegminal apices, which are slightly more acute, and slightly shorter wings with different coloration of area of costal veins and of branches of axillary vein at base of appendicular field.

Type.— ♀ ; Gatun, Canal Zone, Panama. July 25 to 31, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 431.]

Size small, form moderately slender as in *azteca*. Head distinctly longer than broad; interocellar area forming, with margins of ocellar areas, a decided projecting but rounded ridge above each antennal socket; ocellar spots distinct. Pronotum rectangulato-oval, narrowing very slightly more cephalad than caudad; surface weakly convex, showing moderate latero-caudal flattening of the disk. Tegmina narrow, costal margin weakly convex to the sharply rounded apex; costal veins numerous (ten), simple; discoidal sectors few (four).[9] Wings proportionately

[7] From ἄσημα = without distinctive marking.

[8] A series of this species, including topotypic material, is before us.

[9] In all of the American species examined these sectors are longitudinal and composed of the median vein with one to three rami, and the ulnar vein, sometimes with one ramus, except in *A. domestica* Saussure and Zehntner and *A. cabimae*, here described, in which the median and ulnar veins have no rami.

broader than in *azteca;* costal veins (eight) weakly arcuate and strongly clubbed distad; medio-discoidal area large with two transverse veinlets, the more distal oblique and sending from slightly below the mesal point a longitudinal branch distad; appendicular field in length about two-fifths that of remaining portion of wing, length equal to width. (The features given below are characteristic of the species of the genus.) Supra-anal plate transverse; free margin evenly convex, with numerous hairs. Subgenital plate roundly produced with medio-distal area defined proximad by a transverse sulcus and cleft medio-longitudinally.[10] Limbs slender. Ventro-cephalic margin of cephalic femora with (two) very slender and elongate proximal spines, succeeded by a row of microscopic, very short, rather closely set spinulae, terminated distad by two very slender spines, very elongate in increasing ratio distad. Ventro-caudal margins of all femora with a few hairs. Ventro-cephalic margins of median and caudal femora with a few elongate, slender spines. Tarsi very elongate;[11] claws of last joint very delicate, elongate; arolium minute.

General coloration ochraceous-buff, disk of pronotum slightly darkened. Head with occiput ochraceous-buff[12] to a moderately broad, transverse band of prout's brown between the ocellar areas; below ochraceous-buff, faintly clouded in places with prout's brown; eyes blackish brown; ocelli light buff. Wings hyaline, weakly iridescent, washed weakly with prout's brown, except in area of costal veins toward their bases and in appendicular field where they are heavily washed with this color; area of costal veins where they are clubbed, and narrow area at the extremities of the rami of the axillary vein bordering the appendicular field, ochraceous-buff.[13]

Allotype.— ♂; Tabernilla, Canal Zone, Panama. May 13, 1907. (A. Busck.) [United States National Museum.]

Agrees fully with type except in the following features. Abdomen more slender, as would be expected in the male sex. Supra-anal plate remarkably specialized: about twice as wide as long, free margin bracket-shaped, with slightly produced mesal apex deflexed; dorsal surface of plate deeply impressed, forming a large meso-proximal depression, about which the caudal margin of the preceding segment is roundly emarginate; three-fifths the distance to the free margin of the supra-anal plate is a low transverse ridge, heavily clothed on its cephalic face with long stiff hairs directed cephalad, which tuft of hairs nearly fills the depressed area of this plate. Subgenital plate simple, slightly the more produced dextrad; free margin curving evenly at dextro-caudal angle, the small simple style there situated elongate conical, about twice as long as basal width; margin interrupted at sinistro-caudal

[10] This is one of the types of female subgenital plate in the Blattidae which we term valvular. See plate II, fig. 4.

[11] The pulvilli are either entirely absent or so minute as to be indistinguishable under the highest magnification of a Zeiss binocular.

[12] In two males before us the ridge between the eyes is cream color, broadening mesad into a large triangular patch, with apex ventrad.

[13] In one paratype before us these markings are even more decided. This feature has been accessible for study only in the few individuals of which the wings have been spread.

angle by a minute transverse ledge with its free margin straight, on which at its inner extremity is situated the sinistral style, this style springing from a socket and similar to but slightly larger than the dextral style.

We would note that the remarkable supra-anal plate here described is a type common to a number of the related species of *Anaplecta*.

Measurements (in millimeters)[14]

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tabernilla, *allotype*	6.3	1.4	2	5.6	1.8
Tabernilla, *paratype*	5.4	1.4	1.9	5.3	1.7
Tabernilla, *paratype*	5.5	1.5	2	5.6	1.8
♀					
Corozal, *type*.....	5.2	1.6	2.1	5.6	1.7
Corozal, *paratype*.....	6.2	1.6	2	5.8	1.8
Tabernilla, *paratype*	5.5	1.6	2	5.2	1.8

In addition to the type and allotype, we have before us the following material, of which the Panamanian examples are designated paratypes.

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, III, 27 to V, 15, 1906, (Barber, Schwarz), 2 ♂, 3 ♀, [United States National Museum].

Trinidad River, Panama, VI, 3, 1912, (Busck), 1 ♀.

Tabernilla, Canal Zone, Pan., V, 13 to VI, 8, 1907, (Busck), 2 ♂, 2 ♀.

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; under dead leaves in jungle), 1 ♀.

Anaplecta sordida new species (Plate II, figure 6.)

The present insect agrees closely with *A. asema* in wing venation, but differs in the very dark general coloration, head with less prominent borders of the ocellar areas, less acuminate tegmina and proportionately less ample appendicular field of the wings. The male sex of this species being unknown, we are less able to state definitely its position in the genus.

Of the other very dark species without pale tegminal margins, we find from the description that, besides differing in other features, *A. otomia* Saussure, is distinctive in the decidedly reflexed lateral margins of the pronotum and tegmina, while *A. dohrniana* Saussure and Zehntner belongs to a different group, in which the wings have the medio-discoidal area showing no longitudinal distal vein.

[14] We find that for several of Saussure's species of the genus, determined with full satisfaction in other respects, our material is distinctly smaller than the measurements given by that author. This is true of our series of the Mexican *azteca*, the typical series of which we do not believe will be found to show as much size difference from the present insect as Saussure's original description (Miss. Sci. Mex., Rech. Zool., vi, p. 17, (1870)) would indicate.

Type.— ♀; Porto Bello, Panama. August 18 to 21, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 428.]

Size small, form somewhat broader than in *asema*. Head appreciably longer than broad, these proportions not as contrasting as in *asema*, interocellar area forming, with margins of ocellar areas, a distinct ridge above each antennal socket, this ridge not projecting as much as in *asema;* ocellar spots distinct. Pronotum trapezoid-oval, narrowing distinctly more cephalad than caudad; surface weakly convex, showing shallow but distinct latero-caudal transverse sulci of disk. Tegmina narrow, costal margin weakly convex to the narrowly rounded apex; costal veins numerous (twelve) and faintly enlarged distad; discoidal sectors few (four). Wings proportionately not as broad as in *asema*, much as in *A. azteca*, venation much as in those species; costal veins (nine) heavily clubbed distad; medio-discoidal area as described for *asema;* appendicular field in length about half that of remaining portion of wing, length slightly greater than width. Supra-anal and subgenital plates and armament of limbs as typical for genus, described under *asema*.

General coloration shining blackish brown. Head uniform, deep ochraceous-tawny; eyes blackish brown. Antennae ochraceous-buff proximad, deepening immediately to blackish brown. Lateral margins of pronotum and marginal field of tegmina transparent, tinged with prout's brown; remaining portions of tegmina translucent, deep, rich prout's brown. Abdomen blackish brown; limbs of same coloration shading to buckthorn brown distad. Cerci buckthorn brown.

Length of body, 5.4; length of pronotum, 1.4; width of pronotum, 2; length of tegmen, 5.1; width of tegmen, 1.8 mm.

In addition to the type, a single paratypic example is at hand.

Cabima, Panama, V, 22, 1911, (Busck), 1 ♀.

This specimen differs in having the head shining blackish brown except for a transverse rectangular area between the ocellar spots which is ochraceous-tawny, while the antennae, cerci and distal portions of the limbs are paler, ochraceous-buff.

Length of body, 5.7; length of pronotum, 1.4; width of pronotum, 1.9; length of tegmen, 5.2; width of tegmen, 2 mm.

Anaplecta gemma new species (Plate II, figure 7.)

This beautiful insect is a member of the Bivittata Group[15] of the species of which it has the characteristic dark markings least extensive. It differs from *A. bivittata* Brunner,[16] in the very weakly suggested dark markings of the pronotum, the distinctly less extensive dark marking of the tegmina and in the greater size.

[15] We have commented upon this group under *A. hemiscotia* on page 20.

[16] A single male of that species, recently recorded by Rehn, from Igarapé-Assú, Brazil, is in the Academy collection.

The male sex of the present species is unknown, and we are consequently unable to compare the genitalia, which we believe, from examination of males of other species of the group in the unstudied material before us, will be found to be very distinctive.

Type.— ♀; Porto Bello, Panama. August 18 to 20, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 429.]

Size small, form slender; much as in *A. hemiscotia*. Head distinctly longer than broad; ridges above antennal sockets nearly as decided as in *A. asema*; ocellar spots distinct. Pronotum much as in *hemiscotia*. Tegmina narrow; costal margin weakly convex to the narrowly rounded apex; costal veins numerous (twelve), simple; discoidal sectors few (five). Wings elongate, not proportionately as broad as in *asema*, in this respect as in *A. sordida*; costal veins (nine) rather heavily clubbed distad; medio-discoidal area large with four transverse veinlets, the distal veinlet angulate one-third its length from median vein, sending from this angle a longitudinal branch distad; appendicular field in length slightly more than two-fifths the length of the remaining portion of the wing, length equal to width. Supra-anal and subgenital plates and armament of limbs as typical for genus, described under *asema*.

General coloration rather pale. Head uniform dresden brown, ocellar spots buffy. Pronotum with lateral margins hyaline tinged with buffy, mesal portion ochraceous-buff, laterad with prout's brown suffusions cephalad, mesad and caudad.[17] Tegmina transparent, heavily tinged with yellow ocher, this strongest distad, with a sharply defined, small, roughly oval, blackish chestnut brown patch meso-proximad in the discoidal field, which sends a weak ray of the same color proximad along the humeral trunk. Abdomen prout's brown; limbs warm buff; cerci buffy suffused with prout's brown.

Length of body, 6.7; length of pronotum, 1.7; width of pronotum, 2.3; length of tegmen, 6.8; width of tegmen, 1.8 mm.

The type is unique.

Anaplecta hemiscotia[18] new species (Plate II, figure 8.)

The present species is a member of the Bivittata Group, the majority of the species of which have two striking dark longitudinal markings on the pronotum;[19] this is also true of *mexicana* and its nearer allies, which species are, however, larger, pale in general coloration and more elongate.

[17] These suffusions clearly analogous in the present species to the striking longitudinal bands found in *bivittata*, *analisignata* and *hemiscotia*.

[18] From ἡμι-σκότια = half dusky.

[19] There are species, however, which should be referred to this group, which have the dark pronotal markings less sharply linear. This is shown to a decided degree in *A. gemma*, here described.

When compared with the species of apparently nearest relationship, *A. bivittata* Brunner,[20] the present insect is found to have the head differently marked, the vertex not being solidly dark, the tegmina differently bicolored and lacking a distinctive meso-proximal dark blotch and the male genitalia showing very distinctive features.

Compared with *A. analisignata* Rehn, the present insect is seen to be larger with very different head and tegminal color pattern.[21]

The tegminal coloration in the present species is very distinctive, though undoubtedly derived from the same type as that found in *gemma*, *bivittata* and *analisignata*.

Type.— ♂; Corozal, Canal Zone, Panama. November 17, 1913. (M. Hebard.) [Hebard Collection, Type no. 430.]

Size small, form slender, slightly more so than in *A. azteca* or *A. asema*. Head distinctly longer than broad; ridges above antennal sockets distinct, not as decided as in *asema*, not as weak as in *A. sordida*; ocellar spots distinct. Pronotum rectangulate-oval narrowing very slightly more cephalad than caudad; surface weakly convex, showing small but distinct latero-caudal transverse sulci of the disk.[22] Tegmina narrow; costal margin weakly convex to the narrowly rounded apex; costal veins numerous (twelve), simple; discoidal sectors few (five).[23] Wings moderately broad; costal veins (seven; seven to nine in the series) strongly clubbed distad; medio-discoidal area large with two (to three in the series) transverse veinlets, the more distal oblique and sending from near its base at the median vein a weakly oblique longitudinal branch distad; appendicular field in length about two-fifths that of remaining portion of wing, length equal to width.

Supra-anal plate moderately transverse; lateral margins convergent, rounding broadly into distal feebly convex portion without angulation, supplied with numerous hairs; dorsal surface highly specialized as in *asema*. Subgenital plate produced scoop-shaped, lateral portions perpendicular: sinistral margin straight produced and weakly declivent to a very wide, more strongly declivent and oblique socket,

[20] A single male of this species, recently recorded by Rehn from Igarapé-Assú, Brazil, in the Academy Collection, is employed for this comparison.

[21] The abdomen is missing in the type and genital comparisons in consequence can not be made. In the remaining described species of the group, *A. pallida* Bolivar, the tegmina are uniform testaceous.

[22] In forms of the present genus in which these sulci are more distinct, smaller latero-cephalic transverse sulci are sometimes feebly indicated.

[23] In some specimens of the series an additional longitudinal vein is weakly defined, distad only, between the discoidal and median veins. This is true for many species of the genus. The number of discoidal sectors varies individually, occasional specimens showing an ulnar ramus or a supplementary ramus of the median vein. The unimportant character of these is shown by the fact that such rami are frequently found in one tegmen and not in the other of the same specimen.

from which springs the sinistral style; distal margin from this point briefly convex nearly to the small dextral style socket, the greatest convexity slightly dextrad of the mesal point; dextral margin over half again as long as sinistral margin, likewise straight produced and weakly declivent from its base. Sinistral style directed mesad and nearly reaching dextral style; elongate, tapering from stout base to slender cylindrical portion before apex, apex flattened and roundly angulato-produced caudad, with a projecting, straight, aciculate production at its ventro-distal margin.[24] Dextral style minute, cylindrical with rounded apex, vertical, three times as long as wide, about one-third as long as sinistral style. Limbs and armament of same typical for genus, as described under *asema*.

Allotype.— ♀ ; Gold Hill, Canal Zone, Panama. November 14, 1913. (Hebard; in heavy vine overgrowth of low bushes.) [Hebard Collection.]

Agrees with type in all ambisexual characters. Supra-anal and subgenital plates typical for genus, as described under *asema*.[25]

Coloration antimony yellow and blackish chestnut. Head with occiput antimony yellow shading to ochraceous-tawny on face, but with narrow vertical suffusions of blackish brown from occiput along inner margins of eyes to ocellar areas.[26] Pronotum with lateral margins transparent buffy, two rather heavy parallel stripes of blackish brown run from the cephalic to the caudal margin, these widening slightly mesad and caudad, median area antimony yellow. Tegmina with marginal and scapular fields and apex and adjacent margin of discoidal field to median vein, transparent, tinged with antimony yellow to old gold; remaining portion of tegmina translucent, blackish chestnut brown, often with a minute point of the paler color proximad in the anal field toward the costal margin. Wings hyaline, weakly iridescent, washed weakly with prout's brown, appendicular field more heavily washed with this color, area of costal veins and area at extremities of rami of axillary vein bordering the appendicular field, heavily suffused with the same color.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	6.1	1.6	2	5.7	1.8
♀					
Allotype	5.6	1.7	2.2	5.9	2

[24] In consequence this resembles in outline the head of the Buffle Head Duck. The paratypic males before us show the shape of the apex of this specialized sinistral style to be variable, ranging from the form found in the type, through broadly enlarged with a disto-ventral angulation, to weakly and roundly enlarged.

[25] The females can be separated from those of other species of the genus by the form of tegmina and wings, and their venation, and by the color pattern. Throughout the genus it is these features which must be relied upon chiefly to separate the females of the different species.

[26] These evidently a continuation of the paired dark pronotal stripes.

The large series before us shows no appreciable size variation, nor is any marked variation in tegminal or wing length indicated, as was also found true for *A. lateralis*.[27]

The extremes of maximum recession and intensification of coloration are not widely different, but the following features should be noted. In recessive examples the paired pronotal dark longitudinal lines are narrower and, in extreme individuals, broken; the tegmina show the dark suffusion much reduced, this remaining strongly defined only in the anal fields and beyond the anal vein. In intensive examples the paired pronotal dark bars broaden and, in extreme examples, almost fuse at the caudal margin and again near the cephalic margin, leaving the small meso-caudal intervening area alone conspicuously pale; the tegmina when at rest appear solidly dark in such examples, except narrowly along the costal margins.

In addition to the type and allotype, we have before us the following material, which may be considered paratypic.

Porto Bello, Panama, IV, 17, 1912, (Busck), 1 ♀.
Taboga Island, Pan., VI, 11, 1911, (Busck), 1 ♂.
Tabernilla, Canal Zone, Pan., VI, 1 to VII, 31, 1907 and 1911, (Busck), 19 ♂, 13 ♀.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♀.
Canal Zone boundary five miles west of Empire, Pan., XI, 14, 1913, (Hebard), 1 ♂.
Paraiso, C. Z., Pan., IV, 24 to V, 10, 1911, (Schwarz, Busck), 1 ♂, 2 ♀.
Cabima, Pan., V, 20 and 22, 1911, (Busck), 2 ♀.
Corozal, C. Z., Pan., XI, 14, 1913, (Hebard), 2 ♀; IV, 6, 1911, (Busck), 1 ♂.
Chorrera, Pan., V, 10 to 17, 1912, (Busck), 3 ♂.

Ootheca.—One female is carrying an almost completely extruded ootheca, with suture dorsad. This ootheca is very remarkable in having a very heavy sutural ridge, in height one-quarter the width of the remaining portion of the ootheca and nearly as wide as high, this ridge showing on its dorsal surface a succession of raised longitudinal fleur-de-lis with their lateral portions elongate and slender. The lateral surface of the ootheca is very strongly convex, partitioned into five convex sections by deep vertical sulci and ribbed longitudinally, showing on each side fourteen carinae. The ootheca is about two millimeters in length.

[27] That such variation is very decided in some species is shown by Shelford for his *A. varipennis*, while in the small series of *A. fallax* before us, great tegminal and wing variation is found.

Anaplecta cabimae new species (Plate II, figure 9.)

This species is widely separated from any other here considered. It shows apparent relationship to the Peruvian *A. alaris* Saussure and Zehntner, differing from that species in the smaller size, unicolorous tegmina and decidedly suffused wings, with different venation of the medio-discoidal area. The sex of *alaris* can not be ascertained from the original description; the male genitalia of that species will probably be found to show distinct differences from those of the present species.

In general coloration and form of tegmina similarity to *A. domestica* Saussure and Zehntner[28] is shown by the present species, which however differs in the smaller size and very distinct tegminal venation.

In general appearance this minute, straw-colored roach looks much like certain species of Coleoptera.

Type.—♂; Cabima, Panama. May 20, 1911. (A. Busck.) [United States National Museum.]

Size very small, form slender for the genus. Head scarcely longer than broad; vertex evenly convex without distinct ridges over the antennal sockets; ocellar spots present, very inconspicuous. Pronotum approaching oval, the caudal margin showing more truncation, this margin very feebly obtuse-angulate convex; surface weakly convex, with no trace of discal sulci. Tegmina extending a brief distance beyond apex of abdomen, narrow; costal margin very feebly convex to near the apex, where it bends more sharply to meet the sutural margin, which is almost straight, apex sharply rounded; costal veins inconspicuous, not numerous (seven), with a few spurious intermediate veins distad; discoidal sectors two in number (the median and ulnar veins, unbranched). Wings not broad; costal veins simple, subobsolete in clouded area (four to five), combining with the similar distal veinlets (four to five), which also spring from the discoidal vein as it curves to meet the median vein at the distal extremity of the medio-discoidal area; medio-discoidal area, before this point, without transverse veinlets; appendicular field in length about three-quarters that of remaining portion of wing, length equal to width.[29]

[28] Two Guatemalan females of *domestica* are before us. Unlike the type, these specimens have the wings suffused, as in *cabimae*, but the radiate field is iridescent, not dull as in that species.

[29] In this example, instead of the anal vein running to the apex of the wing along the medio-longitudinal fold, an entirely different venation is found. From examination of other individuals of the species, we feel satisfied that this is a remarkable individual variation and not of any specific value, as conditions from the type described below to the normal are found in the series of this species at hand.

Cephalic portion of appendicular field with a vein (ulnar, recrudescent?) which runs a brief distance obliquely from the proximo-internal angle toward the mesal portion of the free margin; caudal portion with a vein (anal, recrudescent?) which runs obliquely from the proximo-internal angle toward the mesal portion of the free margin and disappears before reaching that margin, as described for *alaris*.

Supra-anal plate transverse, free margin evenly convex, dorsal surface unspecialized. Subgenital plate extending the same distance caudad as the supra-anal plate, surface evenly convex, free margin with convexity greatest dextrad, where the production is a little the greatest; dextral style situated at that point, a minute knob no longer than broad; minute sinistral style situated in the same relative position sinistrad, two-thirds as large as dextral style but otherwise similar. Limbs and armament of same type as described from *A. asema*, but in the present species showing the following decided reduction. Ventro-cephalic margins of cephalic femora lacking the proximal heavy spines; cephalic margins of median and caudal femora with a single spine or sometimes with one or more of these margins entirely unarmed.[10] Ventro-caudal margins of limbs unarmed.

Allotype.— ♀; same data as type. [United States National Museum.]

Agrees with type in ambisexual characters, differing in the following respects. Form very slightly but appreciably more robust. Tegmina reaching very slightly beyond apex of abdomen. Supra-anal and subgenital plates typical for genus, as described under *asema*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	3.8	1.2	1.65	4.1	1.4
♀					
Allotype	4.6	1.2	1.7	3.8	1.4′

Very little size variation is shown by the present series. The sexes have the tegminal length ranging from 3.8 to 4.3 mm. The males have the body length from 3.8 to 4, the females from 4.4 to 4.8 mm.

Coloration.—Dorsal surface and antennae immaculate, shining, ochraceous-tawny. Head deep ochraceous-tawny, eyes blackish chestnut brown. Tegmina entirely unicolorous, moderately transparent, ochraceous-tawny. Wings suffused with prout's brown, this heavy in the brief area of the costal veins and cephalic portion of the appendicular field, weakest in the medio-discoidal area and in the radiate field, which shows no trace of iridescence. Underparts and limbs pale, the ventral surface of the abdomen palest, ochraceous-buff tinged with tawny.

Intensification and recession in the present series is slight; the darker individuals have the antennae much darker, prout's brown, while the underparts are uniformly ochraceous-tawny.

In addition to the type and allotype, the following specimens are considered paratypes.

Rio Trinidad, Panama, V, 5, to VI, 10, 1911 and 1912, (Busck), 1 ♂, 4 ♀.

Tabernilla, Canal Zone, Pan., V, 17 and VI, 8, 1907, (Busck), 1 ♂, 1 ♀.

Cabima, Pan., V, 18 to 21, 1911, (Busck), 2 ♂, 1 ♀.

[10] As has been noted elsewhere, reduction in the armament of the limbs in a species of the Blattidae appears to be accompanied by irregularity in the spines which remain. This is true for the present species and is generally met with in the species of the genus *Blaberus*.

Subfamily PSEUDOMOPINAE

A Key to the Described American Genera Belonging to the Group Blattellites

A. Ventro-cephalic margin of cephalic femora with a row of spines which decrease suddenly in size mesad, those distal being piliform; or armed with a row of spines which are entirely piliform.[31]

B. Tarsal claws unspecialized. Interocular space showing no ridge.

C. Pulvilli and arolia absent. (Limbs stout. Ventro-cephalic margin of cephalic femora with a row of piliform spines, with two heavy distal spines. Tegmina with discoidal sectors oblique.[32] Dorsal surface of male abdomen specialized. Wings with costal veins very weakly clubbed, ulnar vein with branches extremely distal or lacking, intercalated triangle very small.)

2. **Ceratinoptera** Brunner

CC. Pulvilli and arolia present.

D. Pulvilli on fourth tarsal joint only. Ventro-cephalic margin of cephalic femora with two heavy distal spines. (Tegmina with discoidal sectors oblique.[33] Wings with costal veins clubbed, intercalated triangle very small.)

E. Dorsal surface of male abdomen unspecialized. Ventro-cephalic margin of cephalic femora with a row of heavy proximal spines, succeeded by a row of minute piliform spines.

F. Limbs slender. Tegmina and wings fully developed.

1. **Euthlastoblatta** Hebard

FF. Limbs stout. Tegmina and wings reduced. (Male concealed genitalia not highly specialized).....4. **Aglaopteryx** Hebard

EE. Dorsal surface of male abdomen specialized. Ventro-cephalic margin of cephalic femora armed with a row of minute piliform spines.[34] (Limbs slender. Interocular space very narrow. Head strongly deplanate. Tegmina and wings fully developed in male, moderately reduced in female.).....3. **Dendroblatta** Rehn

DD. Pulvilli on all four proximal tarsal joints. Ventro-cephalic margin of cephalic femora with three heavy distal spines. (Ventro-cephalic margin of cephalic femora with a row of heavy proximal spines, succeeded by a row of minute piliform spines.)

E. Tarsal claws symmetrical.

F. Tegmina with discoidal sectors decidedly oblique. Dorsal surface of male abdomen specialized. (Wings with costal veins very briefly and

[31] In this type there is evidence to show that some, if not all, of the species have had the heavy proximal spines lost through atrophy.

[32] Individual reduction in the tegmina of the species of this genus frequently results in the obliteration of the discoidal sectos.

[33] In the genus *Aglaopteryx* material is found with tegmina so reduced that the discoidal sectors are frequently obliterated.

[34] Variable in this feature. Individually armed with very few or no heavy proximal spines.

decidedly clubbed, intercalated triangle small but moderately well developed. Tegmina and wings fully developed in both sexes.[35])

5. **Eudromiella** new genus

FF. Tegmina with discoidal sectors longitudinal. Dorsal surface of male abdomen unspecialized.

G. Form very broad. Wings with costal veins not clubbed, anterior field moderately narrow, intercalated triangle small.

9. **Platylestes** Hebard

GG. Form slender but very compact. Wings with costal veins clubbed, anterior field very narrow, intercalated triangle rather strongly developed. (Head with vertex convex, interocular space wide. Pronotum strongly convex for the group.)

10. **Chromatonotus** new genus

EE. Tarsal claws asymmetrical, the cephalic much shorter than the caudal. (Tegmina with discoidal sectors oblique. Dorsal surface of male abdomen specialized. Wings with costal veins weakly or hardly at all clubbed, intercalated triangle very small.)

F. Form broad. Tegmina moderately broad. General coloration pale. Abdomen of male conspicuously constricted beyond sixth dorsal segment.....6. **Latiblattella** Hebard

FF. Form very broad. Tegmina broad. General coloration rich and rather dark. Abdomen of male not as conspicuously constricted beyond sixth segment.....7. **Antitheton** Hebard

BB. Tarsal claws strongly specialized. Interocular space showing a transverse ridge. (Pulvilli on four proximal tarsal joints. Arolia present. Decrease in size of spines of ventro-cephalic margin of cephalic femora not as decided as is usual for the species showing "type B" armament, with two heavy distal spines. Tegmina with discoidal sectors longitudinal. Dorsal surface of male abdomen unspecialized. Wings with costal veins clubbed distad, intercalated triangle small. Interocular space narrow. Tegmina and wings fully developed.[36])

15. **Lophometopum** new genus

AA. Ventro-cephalic margin of cephalic femora with a row of spines which decrease gradually in size, termed "type A." (Pulvilli on four proximal tarsal joints. Arolia present.)

B. Tegmina with discoidal sectors oblique. (Tarsal claws unspecialized.)

C. Wings with costal veins not clubbed, ulnar vein with a great number of branches, intercalated triangle subobsolete. Dorsal surface of male abdomen unspecialized. (Ventro-cephalic margin of cephalic femora with three heavy distal spines. Tegmina and wings fully developed.[37])

8. **Macrophyllodromia** Saussure and Zehntner

[35] The distal row of spines on the ventro-cephalic margin of the cephalic femora in this genus is composed of spines which are best termed subchaetiform; these spines are very small but not as hair-like as is characteristic of the species showing "type B" armament.

[36] The female sex for this genus is unknown.

[37] The female sex for this genus may still be unknown.

CC. Wings with costal veins clubbed, ulnar vein with few branches, intercalated triangle present. Dorsal surface of male abdomen specialized.

D. Interocular space narrow, wrinkled. Ventro-caudal margin of cephalic femora armed (with four and one distal spines). Wings with costal veins very strongly clubbed, intercalated triangle well developed for the group, moderately large, radiate field exceptionally ample. Tegmina and wings fully developed in both sexes. (Ventro-cephalic margin of cephalic femora with two, approaching three, heavy distal spines.)

11. **Rhytidometopum** new genus

DD. Inter-ocular-ocellar area raised and flattened, particularly in male. Ventro-caudal margin of cephalic femora unarmed. Wings with costal veins feebly clubbed, intercalated triangle small, radiate field normal. Tegmina and wings fully developed in male, reduced in female. (Ventro-cephalic margin of cephalic femora with two heavy distal spines.)

12. **Supella** Shelford

BB. Tegmina with discoidal sectors longitudinal. (Wings with intercalated triangle small. Tegmina and wings fully developed in male,[38] fully developed or slightly reduced in female.)

C. Ventro-cephalic margin of cephalic femora with two heavy distal spines. Tarsal claws specialized.

D. Size small for group. Ventro-caudal margin of cephalic femora with two and one distal spines. (Dorsal surface of male abdomen unspecialized.)

13. **Cariblatta** Hebard

DD. Size larger, medium small to large for group. Ventro-caudal margin of cephalic femora with three or more and one distal spines. (Dorsal surface of male abdomen unspecialized or specialized.[39]) . . 14. **Neoblattella** Shelford

CC. Ventro-cephalic margin of cephalic femora with three heavy distal spines. Tarsal claws unspecialized. (Dorsal surface of male abdomen highly specialized.) . . . . . 16. **Blattella** Caudell

Euthlastoblatta compsa[40] new species (Plate II, figures 10 and 11.)

This species represents a group of the present genus, of which we have two additional undescribed Central American species before us, differing from what we may term the Abortiva Group, in the absence of a striking pale transverse band toward the caudal margin of the pronotum and the fact that the most striking male genitalic specialization occurs in the styles.

Compared with males of *E. abortiva* (Caudell), those of the present species are found to differ also in the narrower interocular

[38] Except in *Cariblatta lutea minima* Hebard.

[39] Among the many species of *Neoblattella*, the males of ***nahua*** (Saussure) and ***fraterna*** (Saussure and Zehntner) alone are known to have the dorsal surface of the abdomen specialized.

[40] From κομψή = neat.

space, more deplanate face,[41] cephalic femora with ventro-cephalic margins showing intermediate spines grading from the heavy proximal to the piliform distal series, longer pronotum with extensive mesal area unicolorous and lateral margins narrower and transparent, more elongate distal enlarged portions of the costal veins of the wings and slightly more produced, but still strongly transverse, supra-anal plate.

Type.—♂; Gatun, Canal Zone, Panama. July 25 to 31, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 432.]

Size medium small, form moderately slender, structure very delicate; much as in *abortiva*. Interocular width about one-third that between the antennal sockets, ocellar spots distinct but irregular, face strongly flattened. Maxillary palpi elongate, with distal joint decidedly enlarged. Pronotum very weakly convex, showing weak but distinct medio-cephalic and latero-caudal flattening; lateral margins very narrow, transparent, very weakly declivent, curving upward to weakly cingulate margins; outline elliptical, showing a decided caudal truncation, point of greatest width mesad. Tegmina and wings fully developed, extremely delicate in structure, with numerous discoidal sectors (twelve) oblique; area of dextral tegmen concealed when at rest, less suffused and with cross-veinlets more decided. Wings with costal veins (eight) elongate clavate distad, beyond these the remaining costal veins are not clavate but fork frequently distad; intercalated triangle small. Dorsal surface of abdomen unspecialized.

Supra-anal plate strongly transverse, but with free margin obtuse-angulate, with apex broadly rounded.[42] Subgenital plate convex; lateral margins convergent and feebly concave in proximal third, remaining third occupied by the broad basal portions of the heavy and deeply inset styles, leaving between these only a narrow aciculate produced median portion of the plate. Styles symmetrical, heavy, broad at bases, with external surfaces there deplanate, thence tapering to the cylindrical and bluntly rounded distal portions which are directed caudad and are nearly attingent, these produced distal portions armed on their dorsal surfaces with a few stout, minute, chitinous spines directed caudad.

Cephalic femora with ventro-cephalic margin armed proximad with heavy elongate spines, which decrease gradually in size and length distad to a row of minute chaetiform spines, terminated by two heavy spines, elongate in increasing ratio distad; ventro-caudal margin armed with a single medio-distal and a single distal spine. Other femoral margins armed with moderately strong spines. Elongate tarsi with a single pulvillus occupying the ventral surface of the fourth joint. Arolia present, distinct but small, as in *abortiva*.

[41] In this feature approaching the condition found in some species of *Neoblattella*.

[42] As but two males of this species are known and the organs of the anal chamber are only partly visible, we do not describe them in detail. We can, however, state that the concealed genitalia are much more simple than in *abortiva*, without the remarkably specialized organ found in that species.

Coloration dark. Head with occiput, to just above ocelli, deep bay; eyes blackish; ocelli buffy; face ochraceous-buff, shading through ochraceous-orange to ochraceous-tawny mesad toward clypeus. Antennae and maxillary palpi prout's brown. Pronotum solid shining blackish brown, except narrow lateral margins which are transparent, faintly tinged with buffy. Tegmina translucent, blackish brown, shading to dresden brown distad and in area of dextral tegmen concealed when at rest; marginal field transparent, faintly tinged with buffy. Wings hyaline, faintly tinged with brown, except in area of costal veins and distal portion of anterior field, where the suffusion is more decided, dresden brown, reaching the maximum in the area of the enlarged costal veins, there translucent, deep prout's brown. Dorsal surface of abdomen buffy, heavily tinged with blackish brown, this suffusion solid on supra-anal plate and preceding segment. Cerci blackish brown, except mesodorsal area which is dresden brown. Ventral surface of insect suffused laterad with blackish brown; remaining portions of coxae and the limbs translucent, buckthorn brown, except dorsal margins of the femora, tibiae and tarsi, which are suffused with blackish brown. Ventral surface of abdomen ochraceous-buff with an orange tinge, suffused with ochraceous-tawny, except narrowly laterad, where brief but decided suffusions of blackish brown occur on each segment.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	9.8	2.8	3.7	10.3	3.5
Paratype	9.7	2.7	3.7	10.2	3.4

In addition to the type, a single paratypic male, bearing the same data, but taken July 28 to August 5, 1916, is before us. This specimen fully agrees with the type.

Two small immature examples from Gatun, and one from Porto Bello, are probably referable to the present species.

Ceratinoptera picta Brunner

1865. *Ceratinoptera picta* Brunner, Nouv. Syst. Blatt., p. 76, pl. i, figs. 4 *a* to 4 *e*. [♂, ♀; Brazil.]

Gatun, Canal Zone, Panama, VII, 15 to VIII, 5, 1916, (Harrower), 1 ♀ with ootheca, 1 small juv.

Rio Trinidad, Pan., V, 1 to 5, 1911, (Busck), 3 ♀, (2 with reduced tegmina, 1 with fully developed tegmina).

Tabernilla, C. Z., Pan., VII, 20, 1907, (Busck) 1 ♀, (with fully developed tegmina).

Cabima, Pan., V, 22 and 24, 1911, (Busck), 1 ♂, 2 ♀, (1 ♂, 1 ♀, with reduced tegmina; 1 ♀, with fully developed tegmina).

In the male before us the tegminal length is 8.7 mm., in the females it ranges from 4.9 to 8.7 mm.

The entire series at hand have the pronotum solidly blackish chestnut, excepting the female with reduced tegmina from Cabima, which has the lateral margins narrowly translucent, this becoming wider latero-caudad and the disk slightly paler meso-caudad than in the other portions.

The distal margin of the supra-anal plate of the male at hand is broadly obtuse-angulate emarginate mesad, with angles rounded, while the styles of the subgenital plate are crowded together mesad in a deep rounded emargination. These features would usually indicate specific differentiation in the Blattidae, but we feel certain are, in the present case, ascribable to individual variation only. Both the present insect and *C. nahua* (Saussure) we know now to vary individually to an exceptional degree. Though the tegminal and wing variation in these species is very considerable, no individuals of either species show any trace of transverse truncation, accompanying the tegminal reduction, as is found in the Mexican *C. tropaia* Hebard.

In one female the ootheca, though over half extruded, is, except immediately at the suture, covered by a mantle, evidently soft in life, supplied with scattered hairs. In another individual the ootheca, half extruded, shows no covering mantle and is seen to have its sides supplied with low and rather widely spaced longitudinal ridges. The suture of the ootheca is supplied with rather widely separated nodes, each of which has its dorsal surface raised in the form of the sign for division (÷). It will be noted that this is in some respects comparable to the oothecae of the species of *Anaplecta* discussed in the present paper, though of less specialized shape, no vertical divisions being apparent, while the suture is very much weaker and more simple.

Dendroblatta sobrina Rehn (Plate II, figures 12 and 13.)

1916. *Dendroblatta sobrina* Rehn, Trans. Am. Ent. Soc., xlii, p. 232, pl. xiv, figs. 11 to 14. [♂, ♀: Chinandega, Nicaragua; Pózo Azúl, Costa Rica; Corozal and Old Panama, Panama; Porto Velho, Brazil.]

Rio Trinidad, Panama, III, 28 to V, 5, 1911 and 1912, (Busck), 5 ♂, 1 ♀, 4 juv.

Corozal, Canal Zone, Pan., II, 12, 1911, (Busck), 1 ♀; XI, 17, 1913, (Hebard; colony of adults and young on tree trunks in clearing, the Mantid, *Liturgousa cayennensis* Saussure also there), 3 ♂, 1 ♀, *paratypes*, 2 small juv.

Old Panama, Pan., XI, 13, 1913, (Hebard; running about on surface of fallen tree trunk), 1 ♀, *paratype*.

Panama. Pan., VI, 1915, (Harrower), 1 small juv.
Chorrera, Pan., V, 2, 1911, (Busck), 1 ♀.

From the material at hand we would note that, in addition to the male genitalic features given in the original description, the dextral lobe of the subgenital plate is concave on its internal surface, covering a very thin chitinous plate of almost equal size, the distal margin of which is convex and armed with heavy curved dentiform spines. In part of the individuals examined this inner plate is concealed completely by the dextral lobe.

These beautiful insects were found to be remarkably agile, running with great rapidity over the tree trunks. When pursued, the adults sometimes took flight, but always returned to the tree they had just quitted. Both adults and young would at times suddenly arrest their movements, their striking coloration then blending astonishingly with the tree trunk upon which they were resting.

One female is at hand bearing an almost completely extruded ootheca, with suture laterad. The ootheca is very thin, subrectangulate in form, the dorsal and ventral margins showing very slight arcuation, approximately 6 millimeters long and 2.9 millimeters wide. The dorsal third is strongly compressed with margin (suture) bearing regular, well separated, small nodes, each of which shows a brief transverse ridge on its dorsal surface. The surface of the ootheca is microscopically very finely and longitudinally substriate, giving a smooth bark-like appearance; the vertical divisions are subobsolete, about ten in number.

The young of this handsome insect are buffy, very strikingly marked with dark brown in a pattern of coloration very different from that of the adult (see plate II, fig. 13). It is interesting to note that this pattern, though having distinctive features, is in many ways much more similar to that found in *Aglaopteryx gemma* Hebard[43] and *Aglaopteryx diaphana* (Fabricius). We would further note the coloration of *Aglaopteryx lita*, here described, the adult of which species shows a type of coloration more suggestive of that of adults of the present species, than of the adults of the two other known species of that genus.

[43] Described; Mem. Am. Ent. Soc., 2, p. 34, pl. 1, fig. 9, (1917).

From these observations we may conclude that the general color type found in immatures of the present species and in adults of *A. gemma* and *A. diaphana* is very primitive, and that these genera thus show their common ancestral stock. Weight is added to the latter deduction by the discovery of *A. lita*, a species which has developed an utterly distinct color pattern, at least in the adult, from the other species of that genus, in some ways rather suggesting that of the present species.

Aglaopteryx lita[44] new species (Plate II, figures 14 and 15.)

The present beautiful species differs very widely from *A. diaphana* (Fabricius), with which it agrees more closely in the tegminal development than with the genotype *A. gemma* Hebard, in its striking and distinctive color and color pattern, slightly narrower interocular space and caudal metatarsus, which is not distinctly longer than the combined length of the succeeding tarsal joints, as in that species.

Type.— ♀; Cabima, Panama. May 18, 1911. (A. Busck.) [United States National Museum.]

Size large for this genus of small species; form robust; structure less delicate than in *diaphana*. Head broad, eyes separated a distance distinctly over half that between the antennal sockets; very small ocellar spots apparent, but not well defined. Maxillary palpi heavy. Pronotum with surface evenly and distinctly convex; margin convex to the broadly rounded and sub-rectangulate latero-caudal angles, showing a distinct flattening of this convexity over the head, caudal margin transverse, showing an extremely feeble convexity. Tegmina reaching to apex of abdomen, strongly chitinous, smooth, the veins very inconspicuous, the discoidal sectors oblique. Wings, though greatly reduced, with numerous and somewhat irregular costal veins, not enlarged distad; median vein forking distad; ulnar vein with two complete but short and distal rami; the discoidal, median and ulnar veins and the rami of the latter connected by transverse veins of nearly the same heaviness; intercalated triangle very small but distinct.

Supra-anal plate transverse, about two and one-half times as broad as long, triangular with apex broadly rounded and incised. Cerci submoniliform, hairy, tapering distad to acute apex, about three and one-half times as long as broad, with eleven appreciable joints, flattened above, convex below with sutures distinct and lateral margins flattened. Subgenital plate very broad, convex; free margin broadly convex except at cerci, where it is broadly and very weakly concave. Limbs heavy and armed as is characteristic of the genus. Ventro-caudal margin of cephalic femora armed with two, and one distal, spines. Length of caudal metatarsus equals combined length of succeeding tarsal joints. Tarsal arolia and pulvilli absent; claws unspecialized, as typical for the genus.

[44] From λιτή = smooth.

Color.—Surface smooth and shining. Head deep bay, ocellar spots minute buffy dots, antennae bay except proximad where they shade to buffy. Pronotum entirely blackish bay, except lateral margins which are ochraceous-buff tinged with ochraceous-tawny, these broadest toward latero-caudal portions of disk. Mesonotum, metanotum and first abdominal segments tawny, this continued mesad on each side of the three succeeding segments as a broad suffusion into the remaining darker, blackish brown, dorsal surface of the abdomen, with the exception of a brief lateral area on each side of the sixth and seventh segments of light ochraceous-buff, these forming a very distinctive buff marking latero-caudad, without, but just preceding, the cercal bases. Tegmina blackish bay distinctively marked with ochraceous-buff, the borders of these pale areas ochraceous-tawny; pale in proximal half of anal field, entire marginal field continuing beyond along the costal margin to median part of tegmina by invading the scapular field, and a large oval area mesad in the scapular field, the axis of which is oblique. Wings buffy, heavily suffused with prout's brown in distal two-fifths of anterior field, branches of axillary vein prout's brown, distal portion of radiate veins tinged with this color. Limbs buffy, with spines and tarsi tawny. Cerci cinnamon brown.

Length of body, 9; length of pronotum, 3.2; width of pronotum, 4.3; length of tegmen, 6.5; width of tegmen, 2.95; length of cercus, 1.9; length of caudal tibia, 3.55; length of caudal metatarsus, 1.65 mm.

The type is unique.

EUDROMIELLA new genus

The single known species of this genus suggests, in its form and delicate structure, species of the genera *Euthlastoblatta* Hebard and *Rhytidometopum*, here described. The bilineate pronotum is a type familiar in *Blattella germanica* (Linnaeus) and many other species of the Group Blattellites.

This genus shows nearest affinity to *Latiblattella* Hebard, differing in the characters of major importance in having the form not as broad; the vertex well rounded, not slightly flattened; the face more convex; both sexes with equally fully developed organs of flight; the tegminal discoidal sectors decidedly, not moderately, oblique; the costal veins of the wings heavily, not very weakly or hardly at all clubbed distad, and the male abdomen less decidedly constricted beyond the specialized sixth dorsal segment.

In linear arrangement this genus comes after *Aglaopteryx* Hebard and before *Latiblattella* Hebard. This is a complex type, sharing features with many diverse genera, such as are so often found among the Blattidae.

The genus is monotypic. GENOTYPE: *Eudromiella bicolorata* new species.

Generic Description.—Size and form medium for the group, structure very delicate. Interocular space moderately wide. Occiput rounding evenly into inter-ocular-ocellar area, which is not strikingly flattened; face not strongly convex with lateral margins rather strongly convergent to clypeal suture. Distal joint of maxillary palpus large, but not as long as preceding joint. Pronotal surface weakly convex. Tegmina and wings fully developed in both sexes; tegminal discoidal sectors decidedly oblique. Wings with costal veins heavily clubbed distad, intercalated triangle not large but moderately conspicuous. Dorsal surface of male abdomen with sixth segment specialized; concealed genitalia complex; subgenital plate asymmetrical.

Ventro-cephalic margin of cephalic femora armed with a series of well spaced long heavy spines, succeeded by a series of closely set chaetiform spines (type B), terminating in three heavy spines, very elongate in increasing ratio distad. Ventro-caudal margin of cephalic femora armed in distal third with well spaced (three and one distal) heavy spines. Other ventral femoral margins well supplied with heavy elongate spines. Four proximal tarsal joints supplied ventro-distad with small pulvilli, these slightly produced caudad but with apices rounded, not acute. Tarsal claws unspecialized. Moderately well developed arolia present.

Eudromiella bicolorata new species (Plate II, figures 16 to 20.)

The pale vertex and darkened face, strikingly bilineate pronotum, bicolored tegmina and wings with area of enlarged portion of costal veins whitish, are distinctive features of coloration in this small roach.

Type.—♂; Tabernilla, Canal Zone, Panama. June 4, 1907. (A. Busck.) [United States National Museum.]

In addition to the generic features already given, we would note the following. Interocular space about three-quarters as wide as that between antennal sockets. Ocellar spots distinct, these areas showing no delimiting contour. Third joint of maxillary palpi very slightly longer than fourth, fifth (distal) joint enlarged, very slightly shorter than (in the series, to as long as) the fourth. Tegmina with numerous discoidal sectors (in the series nine to fourteen, the latter number due to distal branching). Wings with (five to seven) branches of the ulnar vein, intercalated triangle small but distinct, its width appreciably less than its depth. Sixth dorsal abdominal segment with a decided median concavity, having on the caudal face a minute but strongly developed semicircular ridge, cephalad of which is a

heavy tuft of agglutinated hairs, with moderately numerous other hairs scattered about laterad on the floor of the median depression; seventh and eighth segments transversely narrower, exposed only narrowly along their caudal margins.

Supra-anal plate decidedly transverse, basal width four times length, feebly triangular with apex sub-bilobate. Cerci small, slender, tapering in distal portion only to acute apex; dorsal surface flattened, much less convex than ventral surface; joints strongly defined, lateral margins of each convex, particularly distad. Concealed genitalia complex: mesad a very heavy elongate chitinous process directed caudad is apparent, tapering and curving weakly to its aciculate apex, sinistrad of which is a large chitinous plate; above is situated a much smaller aciculate process and dextrad a plate of similar length which is rounded at its broad apex. Subgenital plate asymmetrical; produced and broadly subchitinous from the caudal margin, developing into heavy and chitinous plates toward the internal margins of the two productions thus formed (the fused and specialized styles), the sinistral longer than broad, tapering very slightly but with apex very broad and rounded; the dextral heavier, more irregular, of approximately the same length but not over half as broad as long; the apices of these well separated plates curving outward, as do the much smaller and attingent, but analogous, plates in males of the genus *Latiblattella*. The brief mesal portion of the distal margin of the subgenital plate between these plates is produced in a minute subchitinous rounded plate with caudal surface deeply concave.[45]

Head ochraceous-buff; occiput showing very faintly four very broad vertical markings of darker shade; eyes and inter-ocular-ocellar area chestnut brown, this continued as a broad suffused band to near apex of labrum, with a pair of buffy dashes ventrad on face. Pronotum with two broad longitudinal bars of blackish chestnut brown, which broaden and diverge slightly caudad throughout their length; intervening area ochraceous-buff with a faint tinge of orange, showing in very faint lines and dots of darker coloration the deep-seated lyrate pattern found well developed in such genera as *Cariblatta* Hebard, *Neoblattella* Shelford and others;[46] lateral margins translucent, ochraceous-buff. Tegmina translucent, ochraceous-tawny, deepening to a line of cinnamon brown running down the humeral trunk, thence straight to the apex of the tegmen, thus bisecting the costal veins, remaining costal marginal portions translucent, ochraceous-buff. Wings faintly tinged with prout's brown, this heavy in proximal area of costal veins and in distal portion of anterior field, ulnar and axillary veins and their branches prout's brown. Abdomen with dorsal surface dark brown mesad, excepting margins of segments which are

[45] Some variation in these appendages is to be expected from their partially subchitinous structure and decided asymmetry, while the fact that both the large plates (styles) are mobile will result in their being found individually in different positions. This is shown by the paratypic material at hand.

[46] A large immature specimen at hand shows that the dark bands are not developed in this species until just before or when the adult condition is reached. This specimen has the pronotal disk showing a lyrate pattern, broken up by twin blotches cephalad and more widely separated blotches mesad, of dark brown.

ochraceous-buff. Underparts, cerci and limbs ochraceous-buff, abdomen suffused proximad and laterad on succeeding segments with dark brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tabernilla, *type*	9.7	2.7	3.7	10.7	3.1
Tabernilla, *paratype*	9.6	2.8	3.8	10.8	3.2
Empire, *paratype*.....	—	2.6	3.7	9	3
Taboga Island, *paratype* .	—	2.9	3.8	10.9	3.6

The width of the intercalated triangle is 1.65 to 1.7 mm.

In addition to the type the following paratypes are before us.

Tabernilla, Canal Zone, Panama, VI, 10, 1907, (Busck), 1 ♂.

Empire, C.Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♂.

Taboga Island, Pan., VI, 11, 1911, (Busck), 1 ♂.

Latiblattella inornata new species (Plate II. figure 21.)

Related to *L. pavida* (Rehn),[47] agreeing in the immaculate coloration and general character of the male subgenital plate; differing in the smaller size, immaculate inter-ocular-ocellar area and, in the male, in the shorter and decidedly heavier styles, with more slender internal process at base of sinistral style, which is nearly as long as that style and reaches nearly to its apex,[48] and in the mesal produced portion of the subgenital plate which is not curled upward along the distal margin.

Type.— ♂; Rio Bejuco, Panama. (W. Schaus.) [United States National Museum.]

Size and form slightly less ample than in any of the described species of *Latiblattella*. Head with interocular space approximately two-thirds as wide as that between the antennal sockets; inter-ocular-ocellar area distinctly flattened; ocelli distinct. Maxillary palpi with third and fifth (distal) joints elongate, each decidedly longer than fourth joint. Pronotum with angles broadly rounded; point of greatest width meso-caudad; caudal margin very feebly convex, truncate. Tegmina with numerous discoidal sectors (twelve) weakly oblique to caudal margin. Wings with costal veins scarcely enlarged distad.

[47] The insufficient descriptions, applicable to but one sex of the two described as *vitrea* by Brunner and to *chichimeca* and *maya* of Saussure and Zehntner, leave us in no doubt as to their being members of *Latiblattella*, but in complete ignorance as far as the most important specific diagnostic characters are concerned. All are apparently distinctly heavier species than *inornata*, as is true also for *alaris* Saussure and Zehntner, which, from the description, can not be generically assigned without considerable doubt.

[48] In *pavida*, this process is only slightly more than half as long as the sinistral style.

Abdomen with proximal dorsal segments unspecialized; sixth with a semicircular mesal area, formed cephalad by a convex ridge and laterad by the weakly convex margins of very suddenly and deeply impressed longitudinal areas, caudad of the cephalic ridge is a narrow, transverse, feebly obtuse-angulate plate, with free caudal margin supplied with a few hairs, caudad of this the median portion of the specialized area is raised in a large blunt process, with lateral margins concave and divergent caudad and dorsal surface clothed with a heavy tuft of hairs radiating cephalad, caudad of this the narrow distal portion of the segment is subchitinous in texture, the caudal margin transverse, but with latero-caudal angles moderately acute-angulate produced, with apex bluntly rounded; seventh segment longitudinally brief, transversely moderately constricted; eighth segment much the same, but with caudal margin sinuous.

Supra-anal plate transverse, triangularly weakly produced, with apex broad and briefly bilobate. Concealed genitalia: soft integument almost completely fills the anal chamber, from which projects mesad a short, flattened, chitinous lobe, with surface microscopically shagreenous and with disto-dextral angle produced in a short spine, which curves feebly sinistrad at its sharp apex; ventrad of this process the integument is produced in a straight, elongate process, tapering evenly to the acute apex, with dextral margin subchitinous. Dextrad, beneath the dextral cercus, an elongate, lanceolate, chitinous process extends meso-caudad, with surface heavily clothed with a microscopic velvety pile. Subgenital plate not large, somewhat asymmetrical; brief lateral margins convex to bases of heavy, elongate, inset styles, between which the brief and delicate meso-caudal portion of the plate is deplanate, weakly produced with free margin weakly convex. Styles stout, elongate, flattened cylindrical, convergent, with immediate apices rounded and curved outward and supplied with a few hairs; dextral style considerably larger than sinistral. Mesad, at base of sinistral style, a moderately stout, flattened cylindrical process curves mesad, thence nearly straight caudad, with immediate apex rounded, not enlarged and curving sinistrad, the median portion with dorsal surface feebly convex and ventral surface deplanate, the ventral margins thus formed microscopically serrate. Limbs and their armament, character of pulvilli and arolia, typical for the genus.[49] Tarsal claws of unequal length, as characteristic for the genus, elongate and slender, the shorter extending well beyond the moderately well developed arolium.

Allotype.— ♀ ;[50] Steamship Tenadores, en route New York to Jamaica. October 19, 1913. (Hebard; alive in hold.) [Hebard Collection.]

Agrees with type, except in the following features. Form decidedly broader, pronotum more ample. Tegmina and wings distinctly less elongate, but extending well beyond the cercal apices. Dorsal surface of abdomen unspecialized. Supra-

[49] Described: Mem. Am. Ent. Soc., 2, p. 38, (1917).

[50] This specimen was very probably taken on at Bocas del Toro, Panama, or Limon, Costa Rica, as these were the ports at which fruit had last been loaded.

anal plate moderately triangularly produced, with lateral margins feebly concave, deeply concave emarginate at apex. Subgenital plate rather strongly convex, very feebly fissate meso-distad, free margin in large part convex, showing a broad but feeble concavity at the point of extrusion of the cerci.

The female sex is very similar to that of *L. pavida*, distinguishable only by the immaculate cephalic coloration and the less ample, narrower pronotum.

General coloration of type buffy, tinged with buckthorn brown. Head ochraceous-buff, ocelli paler, eyes blackish brown. Pronotum, with disk ochraceous-buff mottled with buckthorn brown, with a few symmetrically placed but weakly defined dots of prout's brown; margins transparent, very weakly tinged with buckthorn brown. Tegmina transparent, weakly tinged with buckthorn brown. Wings hyaline, showing a very feeble iridescence, distal area of anterior field weakly tinged with buckthorn brown. Body and limbs light ochraceous-buff shading to ochraceous-buff, the dorsal surface of the abdomen tinged laterad with buckthorn brown, mesal specialization of sixth segment cinnamon brown with hairs tawny.

The female is generally similar in coloration. The general coloration shows a slightly more tawny tinge, the disk of the pronotum being more tawny with fewer dark dots.[51] The dorsal surface of the abdomen is more heavily and extensively suffused, mummy brown distad, the lateral margins narrowly outlined in light ochraceous-buff.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	13	3	4.1	12.3	3.8
♀					
Allotype	10	3.3	4.6	11.4	3.8

The pair is unique.

Latiblattella angustifrons new species (Plate II, figure 22.)

Closely related to the preceding species, *L. inornata*, the males agreeing in size, coloration of pronotum and tegmina and general character of male subgenital plate; differing particularly in the narrower interocular space, shorter and heavier process at the base of the sinistral style, decidedly shorter and heavier tarsal claws and somewhat smaller arolium (compare figures 21 and 22, Plate II.)[52]

[51] In these features, closely agreeing with the type series of *pavida* before us. In that species a weak buffy marking is present mesad between the antennal sockets, margined laterad with a somewhat darker suffusion than the general coloration of the face.

[52] The dark longitudinal markings of the vertex, suffusion of the face and the shorter tegmina and wings, with veins of the latter darkened, may represent additional specific diagnostic features, or may prove to be due to mere individual variation. This can be determined only when series of the insect have been obtained.

Type.—♂; Porto Bello, Panama. February 18, 1911. (A. Busck.) [United States National Museum.]

Agrees with *inornata*, as described, except in the following features. Head with interocular space slightly less than one-half as wide as that between the antennal sockets.[53] Tegmina and wings slightly shorter than in *inornata*. Wing veins darkened; costal veins showing distinct distal enlargement.[54] Concealed genitalia:[55] the mesal projecting lobe is subchitinous and the lanceolate dextral process shows no velvety pile. Subgenital plate as described for *inornata* except for the following feature; mesad at base of sinistral style, a stout cylindrical process curves in an even arc, so that its apex touches the sinistral style; the brief meso-caudal portion of the plate fits in tightly between the styles, its margin curled inward along the dextral style. Tarsal claws of unequal length, as characteristic of the genus, rather short and appreciably stouter than in *inornata*, the shorter not extending beyond the well developed arolium.

General coloration of type buffy, tinged with buckthorn brown. Head with vertex buffy with vertical blackish chestnut stripes, remaining portions, as well as eyes and lateral portions of body and abdomen, shining blackish chestnut, except the ocellar spots and a subocular dot on each side which are buffy. Limbs buffy. Median portion of abdomen and all of subgenital plate ochraceous-tawny. Pronotum with disk ochraceous-buff, mottled with buckthorn brown, with a few symmetrically placed but weakly defined spots of prout's brown, margins of pronotum transparent, very weakly tinged with buckthorn brown. Tegmina transparent, weakly tinged with buckthorn brown, but more heavily so than in *inornata*. Wings hyaline, showing a feeble iridescence, veins translucent dresden brown.

The paratype is less intensively colored, the face having a considerable mesal buffy suffusion, the ventro-lateral portions not darkened and the pronotal markings reduced.

In the maximum recessive condition of coloration it is probable that individuals of this species would show in coloration close similarity to the examples of *inornata* here described.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *type*	11.1	3	4.1	11.3	3.6
Taboga Island, *paratype*.	10.1	2.9	3.8	11.2	3.7

In addition to the type, a single male paratype from Taboga Island, Panama, taken June 14, 1911, by Busck, and two immature males, bearing the same data, but taken June 10 and 11, are before us.

[53] In the paratype even narrower, nearer one-third than one-half as wide.

[54] This is decidedly greater than in *inornata* and aberrant for the genus, in the paratype at hand it is not as marked.

[55] The concealed genitalia appear to have been soft and misshapen in the type, the anal chamber is crushed in the paratype.

In the immature examples the darker markings, found in the early stages of species of the present genus, are unusually extensive. The disk of the pronotum in one is heavily suffused, in the other with large maculae of blackish chestnut brown meso-laterad and with two smaller and more approximate maculae cephalad of these, the remaining portions buffy. The mesonotum is blackish chestnut brown except for a broad meso-proximal area the caudal margin of which is convex, and lateral portions, which are buffy. The metanotum is buffy, narrowly marked along the caudal margin with blackish chestnut brown. The median and four proximal dorsal abdominal segments are chestnut brown, becoming blackish laterad before the lateral margins, which are buffy brown; the succeeding segments are buffy, the more distal washed with brown. The head is blackish chestnut brown, shading to hazel on the occiput.

MACROPHYLLODROMIA Saussure and Zehntner

1893. *Macrophyllodromia* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 46.

This genus was erected for the single species, ***maximiliani***, described by Saussure[56] as a member of the genus *Pseudophyllodromia*. It was apparently considered to be of not more than subgeneric value, but we feel satisfied that not only should it be given full generic status, but also that it represents one of the most distinctive and in some respects most aberrant units of the Group Blattellites.

We have prepared the following generic description, based on the material of the species before us. From the literature we believe that all of the characters here given hold good for ***maximiliani***, as the two known species are clearly closely related.

The genus is remarkable among the Blattellites for its relatively large size and unusual wing venation, which resembles much more closely the type found in the genus *Periplaneta*, of the Subfamily Blattinae, than that of any of the Blattellites, showing, however, no incomplete rami of the ulnar vein.

Among the described genera of the Blattellites, we would place *Macrophyllodromia* after *Latiblattella* Hebard and before *Platylestes* Hebard. It agrees with these genera in having three heavy distal spines on the ventro-cephalic margins of the cephalic femora, the

[56] 1873. Mem. Soc. Sci. Phys. Nat. Genève, xxiii, p. 100, pl. x, fig. 35. [Mexico.]

four proximal tarsal joints with pulvilli, the tarsal claws unspecialized; with *Latiblattella* in the oblique tegminal discoidal sectors; with *Platylestes* in the unspecialized dorsal surface of the male abdomen.

It differs signally from these genera in having the armament of the ventro-cephalic margins of the cephalic femora of "type A," as in *Supella* Shelford. Thus the combination of characters found in this genus is distinctive, but particularly is it differentiated in the wing venation as discussed above.

Generic Description.—Size very large, form moderately broad and structure rather chitinous for the group. Interocular space narrow. Inter-ocular-ocellar area flattened; face transversely rather strongly convex, narrow below the eyes with lateral margins moderately convergent to clypeal suture. Pronotum slightly more convex than is usual in the group. Tegmina and wings fully developed.[57] Tegminal discoidal sectors oblique (sixteen). Wings with costal veins not enlarged distad; discoidal and ulnar veins with a great number of closely placed branches (thirteen to fifteen for the ulnar vein), all of the branches of the ulnar vein complete to the free margin of the wing; intercalated triangle subobsolete. Dorsal surface of male abdomen unspecialized.

Ventro-cephalic margin of cephalic femora armed with a series of moderately elongate heavy spines, which decrease gradually in length mesad, the distal spines only slightly shorter than those proximad, terminating in three heavy elongate distal spines in increasing ratio. Ventro-caudal margin of cephalic femora with a few (four to five) heavy elongate spines. Other femoral margins well supplied with heavy elongate spines. Four proximal tarsal joints supplied ventrad with large distal pulvilli; that of the third caudal tarsal joint occupying almost all, of the fourth joint all, of the ventral surface. Tarsal claws unspecialized. Well developed arolia present.

Macrophyllodromia splendida new species (Plate III, figures 1 to 4.)

The two dark parallel pronotal bars are very striking features in this otherwise generally immaculate insect, which aside from this feature, has some general superficial resemblance to *Neoblattella adspersicollis* (Stål), though of much richer general coloration.

[57] The female sex is unknown for this genus.

From *M. maximiliani* (Saussure) this insect is easily separated by its smaller size, dark caudal margin of the pronotum and immaculate tegmina.

Type.—♂; Porto Bello, Panama. February 21, 1911. (E. A. Schwarz.) [United States National Museum.]

In addition to the features given in the generic description, we would note the following. Interocular space one-fourth as wide as that between the antennal sockets.[58] Eyes projecting rather decidedly laterad. Ocellar spots rather large, distinct. Maxillary palpi with third joint slightly longer than fourth, fifth (distal) joint about three-quarters as long as fourth, enlarged. Supra-anal plate strongly transverse, basal width nearly six times length, triangular in general outline, briefly cleft meso-distad, with apices thus formed broadly rounded. Cerci elongate lanceolate (with sixteen joints), seventh to fourteenth joints well-defined, each with lateral margins convex.

Subgenital plate asymmetrical; sinistral marginal portion thickened, weakly concave oblique produced to slightly beyond the median point, where it is convex, curving into a deep cleft which extends more than half the distance to the margin of the preceding segment, thus forming a sinistral lobe, with a few minute scattered teeth ventrad on its broadly rounded apex. On this lobe, along the margin at the median cleft of the plate, is a rounded ridge (the sinistral fused and specialized style) which is heaviest at the base of the cleft, its surface supplied with stiff hairs and minute scattered teeth. Dextral margin of subgenital plate showing a strong concavity at the cercus, thence convex to a straight channel which runs across the surface of the plate to the base of the median cleft of the plate, at this point a slight angulate-emargination is formed, from this point the margin is convex and the plate is thickened, thus forming a dextral lobe (the dextral fused and specialized style) not as large and slightly less produced than the sinistral lobe, well supplied with stiff hairs, its sinistral margin forming the margin at the median cleft of the plate. The heavy pair of plates beneath the supra-anal plate are seen to be very large and are all that is visible within the anal orifice in this specimen.

Head with vertex, cheeks (including ocellar spots), antennae and palpi clear ochraceous-buff, the palpi very faintly suffused, with ultimate joint suffused proximad with prout's brown; eyes and inter-ocular-ocellar area shining blackish brown, continued as a broad vertical band with margins sharply defined on face to labral suture. Pronotum with two broad meso-lateral longitudinal bands of blackish brown, which broaden slightly mesad and strongly caudad, there joining and occupying the entire caudal margin; area between these bands clear ochraceous-buff with a strong orange tinge, remaining broad lateral margins of pronotum transparent, very faintly tinged with buckthorn brown. Tegmina translucent, rather strongly tinged with buckthorn brown having a tawny tone, except the costal fields which are transparent, very faintly tinged with buckthorn brown. Wings

[58] The type has the vertex somewhat crushed. These features are more readily seen in the paratype.

transparent, suffused with brussels brown; suffusion sudan brown in area of ulnar and discoidal veins, becoming still darker, amber brown, toward the costal margin. Dorsal surface proximad cinnamon brown shading to blackish chestnut brown distad, cerci of that color. Underparts and limbs pale ochraceous-tawny, the abdomen becoming cinnamon brown distad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia
Type.....	15.8	4.7	6.2	20.2	6.2	7.2
Paratype	16.8	4.6	6	18.9	6.3	—

In addition to the type, a single male paratype, taken at the same locality, February 28, 1911, by Busck, is before us.

CHROMATONOTUS[59] new genus

In linear arrangement we place this genus after *Platylestes* Hebard, and before *Rhytidometopum* here described. In general form and structure close resemblance is shown to some of the small species of the genus *Ischnoptera* Burmeister, of the Group-Ischnopterites.

Though in size and form exceedingly different from *Platylestes*,[60] these genera agree in having "type B" armament of the ventro-cephalic margins of the cephalic femora with three heavy distal spines, the tegminal discoidal sectors longitudinal, male dorsal abdominal segments unspecialized and four proximal tarsal joints supplied with pulvilli. Signal difference from *Platylestes* is found in the distinctive coloration, much less transverse pronotum, very much narrower tegmina and anterior field of the wings, the well developed intercalated triangle of the wings, more elongate and slender cerci and caudal metatarsi much longer, not distinctly shorter, than the combined length of the succeeding joints.

Though in general appearance much closer to *Rhytidometopum*, very great structural difference is found, these genera in primary features agreeing only in the wings having a well developed intercalated triangle, the tarsal joints having similar pulvilli and the tarsal claws being unarmed.

[59] From χρῶμα and νῶτος. Colored back; in allusion to the fact that in the four species of this genus at hand, all have the pronotum conspicuously and distinctively marked.

[60] See Hebard, Trans. Am. Ent. Soc., xlv, p. 97, pl. xvii, fig. 1, (1919).

The pronotal type resembles more closely the normal in the Group Ischnopterites than it does that found in the related genera of the Group Blattellites.

Material representing four species of the genus is before us.[61] GENOTYPE: *Chromatonotus lamprus* new species.

Generic Description.—Size small, form slender, structure not as delicate as is usual in the Group. Interocular space wide; vertex rounding evenly into face; ocellar spots in the male sex decided, with flat surfaces oblique to intervening area as in *Ischnoptera*, weakly developed in the female sex; face moderately convex, very brief lateral margins strongly convergent to clypeal suture. Maxillary palpi short, heavy distal joint as long as or longer than any other. Pronotum feebly transverse; surface convex, more so than is usual in the Group Blattellites, much as in some of the smaller species of *Ischnoptera*. Tegmina and wings fully developed in both sexes. Tegmina narrow, discoidal sectors (seven or eight) longitudinal. Wings with anterior field narrow, resultantly short costal veins thickened distad; discoidal and unbranched median vein connected by numerous transverse veinlets; ulnar vein with few (one to (rarely) three) complete branches, showing bases only of transverse veinlets toward fold of the wing; intercalated triangle broad and conspicuous; radiate field ample. Dorsal surface of male abdomen unspecialized; paired plate beneath supra-anal plate highly specialized; subgenital plate asymmetrical.

Limbs rather heavy and short for the Group. Ventro-cephalic margin of cephalic femora armed with a few well-spaced heavy elongate spines, succeeded by a row of minute chaetiform spines, terminating in three heavy and very elongate distal spines in increasing

[61] In addition to the two species here described, we have before us material of the following species from Trinidad:

Chromatonotus infuscatus (Bruner)

1906. *Phyllodromia infuscata* Bruner, Jour. N. Y. Ent. Soc., xiv, p. 139. [Near Port of Spain, Trinidad.]

Chromatonotus notatus (Brunner)

1893. *P[hyllodromia] notata* Brunner, Proc. Zool. Soc. London, 1893, p. 602, pl. lii, figs. 1a, b. [♂, ♀: St. Georges and Balthazar, Grenada, British West Indies.]

1906. *?Phyllodromia notata* Bruner, Jour. N. Y. Ent. Soc., xiv, p. 139. [Near Port of Spain, Trinidad.]

ratio. Ventro-caudal margin of cephalic femora armed throughout its length with (three or four and one distal) well-spaced heavy spines. Other ventral femoral margins well supplied with heavy elongate spines. Ventral surface of four proximal tarsal joints supplied distad with minute simple pulvilli. Tarsal claws unspecialized. Moderately well-developed arolia present.

Chromatonotus heterus[62] new species (Plate III, figure 5.)

The present insect differs decidedly from the other species of the genus in the distinctive development of the pronotal color pattern and in the relatively shorter tegmina and wings. The male will doubtless show distinctive genitalic features, as do the males of the two species for which this sex is known.

In linear arrangement we would place this species first in the genus, followed by *infuscatus* (Bruner), *notatus* (Brunner) and *lamprus* here described.

The pronotal color pattern in this insect, though less clearly defined, shows a striking similarity to that of *Euthlastoblatta abortiva* (Caudell).

Type.— ♀; Chorrera, Panama. May 11, 1912. (A. Busck.) [United States National Museum.]

In addition to the generic characters given, we would note the following. Size slightly smaller than in *lamprus*, form much as in that species. Interocular space very slightly greater than width between antennal sockets; ocellar spots very small, with area weakly defined, even smaller than in this sex of *lamprus*. Enlarged fifth (distal) joint of maxillary palpus very slightly longer than third joint, decidedly longer than fourth joint. Tegmina and wings proportionately not as elongate as in *lamprus*; wings with greatest width of anterior field about one-fourth its length, short costal veins strongly enlarged distad (eleven), intercalated triangle nearly as wide as deep. Supra-anal and subgenital plates as in this sex of *lamprus*.

Head blackish carob brown. Proximal antennal joint, ocellar spots, mouthparts and maxillary palpi buffy; remaining portions of antennae chestnut brown. Limbs ochraceous-buff tinged with tawny. Ventral surface of abdomen cinnamon brown, deepening to chestnut brown laterad. Pronotum shining, margined narrowly cephalad (though not as narrowly as in *lamprus*) and more broadly laterad with ochraceous-buff, this pale coloration crossing the dark remaining portions of the pronotum as a narrow band just before the caudal margin; leaving the very large meso-cephalic area and caudal margin blackish carob brown, the margins of these dark areas suffused, not sharply defined. Tegmina translucent, evenly and weakly tinged with buckthorn brown. Wings translucent, very weakly tinged with buckthorn brown; costal veins buckthorn brown. Dorsal surface, including

[62] From ἕτερος = different.

proximal portion of abdomen, shining cinnamon brown, shading in remaining portion of abdomen to blackish brown. Cerci prout's brown.

Length of body, 8.5; length of pronotum, 2.35; width of pronotum, 3; length of tegmen, 8.4; width of tegmen, 2.8; length of caudal tibia, 3.2; length of caudal tarsal joints, 2.8 mm.

The type is unique.

Chromatonotus lamprus[63] new species (Plate III, figures 6 and 7.)

This handsome species is closely related to *C. notatus* (Brunner), differing strikingly only in having the pale margin of the pronotum cephalad much narrower, all but the costal field of the tegmina rather strongly suffused, not having the tegmina with humeral trunk strikingly darker than the remaining portions and in the very differently specialized male genitalia.

Compared with *C. infuscatus* (Bruner), these species are seen to be larger, with pale marking caudad on disk of pronotum strongly transverse, not subcircular with a ray extending cephalad, as is normal in that species.

Type.—♂; Tabernilla, Canal Zone, Panama. May 14, 1907. (A. Busck.) [United States National Museum.]

In addition to the generic characters described, we would note the following. Size (averaging) larger than in *infuscatus*, slightly smaller than in *notatus*. Interocular width equals length of first antennal joint. Ocellar spots large and conspicuous. Enlarged fifth (distal) joint of maxillary palpus equal in length to third joint, slightly longer than fourth joint. Wings with greatest width of anterior field about one-fourth its length; intercalated triangle nearly as wide as deep.

Supra-anal plate feebly transverse, length three-quarters proximal width, free margins straight convergent to distal portion, which is less decidedly chitinous, supplied with long hairs, broadly rounded but with a minute median emargination. Cerci small, elongate and slender (ten to eleven joints), the sutures well marked, the lateral margins of the joints nearly straight, but each (from six to ten) distinctly narrower than its predecessor; dorsal surface flat; ventral surface of each joint strongly convex with very narrowly cingulate lateral margins. Concealed genitalia: paired plate beneath supra-anal plate highly specialized; sinistral half chitinous, flattened against wall of anal orifice, with a small slender process, with apex sharply rounded, situated below base of cercus and directed caudad; dextral half developed into two lobes with apex of each produced in an elongate aciculate projection, these parallel and directed mesad.[64]

[63] From λαμπρός = handsome.

[64] In males of the closely related *notatus* the dextral half is developed into a single lobe supplied with numerous short sharp teeth.

Subgenital plate rather strongly convex, supplied with elongate scattered hairs, free margins evenly and moderately convex-convergent to mesal fourth, which is produced and rather strongly convex, showing a slight angulation mesad; sinistral style minute, simple, cylindrical, feebly tapering to sharply rounded apex, about three times as long as basal width, situated at sinistral base of median produced portion; dextral style similar, except that apex is formed by two minute but stout teeth and with a similar tooth at its base dextrad, this style situated at about the median point on the dextral margin of the median production of the subgenital plate and directed sinistro-caudad.

Allotype.— ♀; Cabima, Panama. May 17, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with male in ambisexual features, differing in the following respects. Interocular space distinctly wider, only slightly narrower than width between antennal bases; ocellar spots smaller with area less decidedly defined. Supra-anal plate similar, but less transverse, length slightly less than half proximal width. Subgenital plate very short and truncate, surface convex and supplied with scattered elongate hairs; free margin moderately convex laterad, transverse in broad mesal portion.

Head blackish liver brown, ocellar spots light buff, antennae prout's brown; mouthparts and palpi buffy, the latter with distal segments heavily washed with prout's brown. Pronotum shining, with cephalic margin narrowly[65] and lateral margins more broadly ochraceous-buff; remaining portions blackish carob brown except for a large transverse elongate-ovate marking of ochraceous-buff mesocaudad, this occasionally tinged with orange. Tegmina translucent, suffused with prout's brown, this regularly distributed but deepest at the humeral trunk,[66] except the costal margin which is broadly buffy, the transition to the darker portions of the tegmina gradual. Wings transparent, very weakly tinged with prout's brown, this very heavy in area of costal veins, heavy in area about the intercalated triangle, weakest in the intercalated triangle. Dorsal surface and cerci prout's brown, abdomen margined narrowly laterad with ochraceous-buff. Ventral surface buffy, laterad with coxae and proximal abdominal segments marked with brown, ventral surface of abdomen often washed with ochraceous-tawny. Limbs buffy, spines and tarsal joints beyond metatarsus slightly darker.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tabernilla, *type*	10.7	2.7	3.65	10.4	2.9
Tabernilla, *paratypes* (3)	9.9–10	2.3–2.75	3.1–3.65	10–10.7	2.9–3
Empire, *paratype*	—	2.6	3.1	10	3
Corozal, *paratype*	9.9	2.65	3.4	10.7	3
♀					
Cabima, *allotype*	9	2.75	3.3	9.8	3

In the series the length of the caudal tarsal joints varies from 2.8 to 3 mm.

[65] In *notatus* the cephalic margin of ochraceous-buff is distinctly wider mesad.

[66] In *notatus* the humeral trunk is rich prout's brown, contrasting strongly with the tegmina, which are otherwise as pale or paler than in the present species.

In addition to the type and allotype the following paratypes are before us.

Tabernilla, Canal Zone, Panama, V, 13 to VI, 16, 1907, (Busck), 3 ♂.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; found dead on ground), 1 ♂.
Corozal, C. Z., Pan., IV, 26, 1911, (Busck), 1 ♂.

RHYTIDOMETOPUM[67] new genus

The single known species of this genus suggests in size, form and delicacy of structure an obscurely colored insect superficially similar to *Euthlastoblatta abortiva* (Caudell).

In the characters of major importance nearest agreement with *Supella* Shelford is found. The present genus has, however, the sexes similar; the interocular space wrinkled, not smooth; the inter-ocular-ocellar area unspecialized, not raised and flattened; the tegminal discoidal sectors moderately, not strongly, oblique, and the wings with the intercalated triangle much more decided and radiate field more ample.

In linear arrangement we place the present genus after *Chromatonotus*, here described, and before *Supella* Shelford. The relationship to both these genera is not at all close. The genus represents one of the complex units, sharing features with many diverse genera, so often found in the Blattidae. Such are manifestly indicative of the great antiquity of this family.

The genus is monotypic. GENOTYPE: *Rhytidometopum megalopterum* new species.

Generic Description.—Size and form medium, structure rather delicate for the Group Blattellites. Interocular space narrow, showing a distinctive transverse wrinkling. Inter-ocular-ocellar area not specialized; face not strongly convex, with lateral margins strongly convergent to clypeal suture. Fifth (distal) joint of maxillary palpi large, longer than preceding joint. Pronotal surface convex, slightly more so than in the usual type in *Neoblattella* Shelford. Tegmina and wings fully developed in both sexes. Tegminal discoidal sectors moderately oblique. Wings with costal veins heavily clubbed distad; intercalated triangle broad and conspicuous; radiate field unusually broad for the Group. Dorsal surface of male abdomen with sixth segment

[67] From ῥῦτίς and μέτωπον, wrinkled forehead.

specialized; subgenital plate and concealed genitalia complex and asymmetrical.

Ventro-cephalic margin of cephalic femora armed with a series of heavy spines, the distal spines much the shorter and the more closely placed, terminating in two heavy and very elongate distal spines in increasing ratio.[68] Ventro-caudal margin of cephalic femora armed throughout its length with well-spaced heavy spines (four and one distal). Other ventral femoral margins well supplied with heavy elongate spines. Ventral surface of four proximal tarsal joints supplied distad with small pulvilli, the apices of which are sharply rounded. Tarsal claws unspecialized, but with a weak indication of an internal flange. Well developed arolia present.

Rhytidometopum megalopterum new species (Plate III, figures 8 and 9.)

The present insect entirely lacks distinctive markings. The brown of the pronotal disk and tegmina is unusually lustrous and rich in tone.

Type.— ♂; Trinidad River, Panama. June 3, 1912. (A. Busck.) [United States National Museum.]

In addition to the generic features already given, we would note the following for the present species. Interocular space two-fifths that between the antennal sockets, very feebly ridged, which ridge shows a number of weak longitudinal creases. Ocellar spots distinct, their areas showing no delimiting contour. Third joint of maxillary palpi slightly longer than fourth, fifth (distal) joint enlarged and in length intermediate between these. Tegmina with numerous discoidal sectors (eight to thirteen in the series, variability due to branching). Wings with (in the series four to six) complete branches of the ulnar vein; intercalated triangle conspicuous, nearly as wide as deep. Sixth dorsal abdominal segment weakly depressed mesad, the depression containing a tuft of agglutinated hairs, seventh and eighth dorsal segments transversely narrower, exposed only very narrowly along their caudal margins.

Supra-anal plate strongly transverse, basal width six times length, distal margin convex between the cerci with an angulation feebly indicated. Cerci small and slender, tapering to acute apex, the joints (twelve) strongly defined, the lateral margin of each convex, particularly distad; dorsal surface only slightly less convex than ventral surface. Paired plate beneath supra-anal plate of male large and unspecialized. Titillator with apex straight, aciculate, directed caudad.

Subgenital plate strongly asymmetrical and irregular; free margin roughly convex, excepting sinistrad where it is broadly and shallowly concave and recurved, to

[68] Occasionally the last spine of the series preceding these is appreciably longer than those before it, thus showing a partial transition toward the forms having three heavy and elongate distal spines.

which portion of this margin is attached a less heavily chitinous plate, about twice as long as wide, directed dorsad, with margin convex (the sinistral fused and specialized style), thickened along its internal margin, this thickened portion armed distad on its external face with a single blunt tooth; dextrad is attached a less heavily chitinous triangular plate (the dextral fused and specialized style), its internal margin thickened into an elongate irregularly cylindrical process, over twice as long and bulky as the analogous sinistral development, bearing a small aciculate thorn at its base, and with its twisted apex curving caudad with the ventro-caudal margin microscopically but very sharply serrate, these serrations directed proximad.

Allotype.— ♀; same data as type but taken May 6, 1911. [United States National Museum.]

Agrees with male in ambisexual features, differing in the following respects. Size and form similar. Supra-anal plate rather deeply rectangulate-emarginate distad, the two apices thus formed rectangulate, sharply rounded. Subgenital plate very feebly produced beyond cercal bases, short, scoop-shaped, entire.

Coloration similar in the sexes. Head chestnut; ocellar spots, a diffused mediolongitudinal line in the inter-ocular-ocellar area and cheeks ochraceous-tawny. Disk of pronotum rich chestnut, paling in a very small meso-caudal area to ochraceous-tawny; lateral margins transparent, rich buff. Tegmina immaculate, translucent, chestnut when at rest, argus brown when spread; costal field transparent, ochraceous-buff, this continued along the costal margin to near its apex. Wings heavily washed with prout's brown in area of costal veins and in areas of rami of ulnar and axillary veins, radiate field washed less heavily with this color, other portions, including intercalated triangle, very weakly washed with prout's brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Rio Trinidad, *type*.....	9.5	2.8	3.7	10.8	3.4
Tabernilla, *paratype*	10	2.8	3.8	11.2	3.7
Chorrera, *paratype*.....	10.5	2.9	3.65	11	3.8
♀					
Rio Trinidad, *allotype*...	9.5	2.8	3.9	10.7	3.3
Paraiso, *paratype*.....	9	3	4	10.9	3.55
Taboga Island, *paratype*..	9	2.9	3.95	10.8	3.65

The width of the intercalated triangle of the wings ranges from 2.1 to 2.3 mm.

In addition to the type and allotype, the following paratypes are before us.

Tabernilla, Canal Zone, Panama, V, 14, 1907, (Busck), 1 ♂.
Paraiso, C. Z., Pan., I, 22, 1911, (Schwarz), 1 ♀.
Taboga Island, Pan., VI, 9, 1911, (Busck), 1 ♀.
Chorrera, Pan., V, 14, 1912, (Busck), 1 ♂.

Supella supellectilium (Serville)

1839. *Blatta supellectilium* Serville, Hist. Nat. Ins., Orth., p. 114. [Mauritius.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 22, 1916, (Harrower), 5 ♂, 2 ♀, 2 juv. ♀, 2 small juv.

Ancon, C. Z., Pan., III, 1911 and VIII, 31, 1910, (Jennings), 10 ♂, 7 ♀, 2 juv.

In a few males of the present series the tegmina are entirely unicolorous, due to recessive coloration. Two of the fifteen males and nine of the ten females are of intensive coloration.

Cariblatta imitans Hebard

1916. *Cariblatta imitans* Hebard, Trans. Am. Ent. Soc., xlii, p. 180, pl. xi, fig. 20, pl. xii, fig. 21. [♂, ♀; Corozal, Panama.]

Alhajuela, Panama, IV, 18, 1911, (Busck), 1 ♂.

Rio Trinidad, Pan., III, 17 to V, 7, 1911 and 1912, (Busck), 4 ♂, 1 ♀.

Tabernilla, Canal Zone, Pan., VI, 10, 1907, (Busck), 1 ♂.

Paraiso, C. Z., Pan., I, 16, 1911, (Busck), 1 ♂.

Cabima, Pan., V, 17 and 19, 1911, (Busck), 1 ♂, 2 ♀.

Corozal, C. Z., Pan., XI, 14, 1913, (Hebard; dead leaves in jungle), 2 ♂, 2 ♀, *type*, *allotype*, *paratypes*.

Ancon, C. Z., Pan., (Jennings; in bush), 1 ♂.

Panama City, Pan., VI, 1915, (Harrower), 1 ♂.

Tabogilla Island, Pan., II, 16, 1912, (Busck), 1 ♂, 2 ♀, 1 with ootheca.

Taboga Island, Pan., VI, 12, 1911, (Busck), 1 ♂.

This species is distinguished from the Panamanian species of *Neoblattella* by its smaller size, only *N. fratercula* Hebard showing close approach in this respect. Males of that species are easily separated by the very distinct subgenital plate, females by the average slightly larger size and more ample pronotum.

That the present insect is in some ways annectant between the genus *Cariblatta* and the species we have assigned to what we term the second section of the Impar Group of the genus *Neoblattella*, is shown by the close agreement in general structure and in the similar male subgenital plate.[69]

In the present series the discoidal sectors (median vein and its branches and ulnar vein) of the tegmina number four to seven, the variation due to differences in the branching of the median vein. In the anal chamber of the males, below the unspecialized paired

[69] In reference to the genera *Cariblatta* and *Neoblattella*, see Hebard, Trans. Am. Ent. Soc., xlii, p. 148, footnote 3.

plate under the supra-anal plate, a single small chitinous thorn is found.

NEOBLATTELLA Shelford

The present is one of the largest American genera of the Blattidae. The great variety of species form groups which are distinctive in various ways, a number of these possessing features which, in different groups, show divergence toward different allied genera. Due to the fact that none of the species are strikingly colored, while in tropical America a number of species belonging to the same group may occur at the same locality, it is often difficult to associate the sexes. The males show a most astonishing diversity of genitalic development. In the groups studied, however, the Nahua Group alone shows the dorsal surface of the male abdomen in any way specialized, while in all the species of the genus, the paired plate beneath the male supra-anal plate is unspecialized. Ignorance of the value of genitalic characters alone has made the descriptions of males by past students difficult to work with.

The females, however, show little or no response to such specialization in the opposite sex, and accurate specific determinations can be made only by the most careful study of other, and usually much less distinctive, features of difference, combined with a knowledge of the usual differentiation between the sexes, large series for comparison, and, if possible, field knowledge of at least some of the species.

In the material here under consideration two groups are represented. A third, the Carrikeri Group,[70] undoubtedly occurs in Panama, material of this group from Costa Rica as well as from Colombia being at hand.

Neoblattella fratercula Hebard

1916. *Neoblattella fratercula* Hebard, Ent. News, xxvii, p. 159, figs. 1 and 2. [♂, ♀; Isla de Cocos, Costa Rica.]

The present species is an aberrant member of the Impar Group of the present genus, which group includes a great number of species of medium small size, in which the sexes are but little dissimilar and the tegmina show distinct cross-veinlets, particularly distad.

[70] See Hebard, Trans. Am. Ent. Soc., xlv, p. 100, (1919).

This insect shows the nearest approach to the forms found in the closely related genus *Cariblatta* Hebard.[71]

Rio Trinidad, Panama, V, 3 and 9, 1911, (Busck), 1 ♂, 1 ♀.
Tabernilla, Canal Zone, Pan., V, 4 and VII, 12, 1907, (Busck), 3 ♀.
Paraiso, C. Z., Pan., I, 15 and 16, 1911, (Busck, Schwarz), 2 ♂.

These specimens are appreciably larger than those of the type series, possibly due to development in a more favorable environment.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Rio Trinidad.....	10.5	2.7	3.6	11.3	3.3
Paraiso.....	9.8	2.6	3.65	11	3.3
Paraiso.....	12	2.8	3.8	11.8	3.7
♀					
Tabernilla (3).....	10.5–11.5	2.75–2.8	3.7–3.7	10.8–11.2	3.3–3.2

Sinistrad within the anal chamber is situated a shaft, directed caudad, which becomes chitinous toward its internal margin and on that margin bears three rather elongate aciculate spines, directed meso-cephalad. This is found to be constant in all the males before us, this including the original series.

Females of this species are very similar indeed to that sex of *N. impar*, *N. panamae* and probably *N. acanthastylata*, all here described. They appear to be separable mainly by the tegmina having the cross-veinlets all distad and inconspicuous and by the smaller pronotum, which probably averages distinctly smaller in this species.

Neoblattella acanthastylata[72] new species (Plate III, figures 10 and 11.)

This interesting species is an annectant type between the aberrant *N. fratercula* Hebard, and the forms of the first section of the Impar Group, which show distinctive specialization about the styles of the male subgenital plate. As in *fratercula*, the tegminal cross-veinlets are only conspicuous in the area of the dextral tegmen, concealed when at rest; in the majority of the species of the Impar Group, the cross-veinlets are conspicuous distad on both tegmina and particularly so in the area mentioned above. In the specialization of the male subgenital plate, the present species shows a very distinctive type.

[71] See remarks under *Cariblatta imitans* on page 52.

[72] From ἄκανθα = spine, and στῦλος = pillar (style); in allusion to the remarkable, though minute, spines at the styles of the male subgenital plate.

Type.— ♂;[73] Gatun, Canal Zone, Panama. July 28 to August 5, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 433.]

Size medium for the group, larger than *fratercula;* form rather slender. Interocular space wide, ocellar spots weakly defined. Maxillary palpi very elongate; third and fourth joints subequal in length; fifth (distal) joint about three-fifths as long as fourth, enlarged, oblique truncate to near its base. Pronotum with surface very weakly convex; the lateral portions very weakly declivent; cephalic and caudal margins truncate, the caudal margin much the broader; lateral margins convex; greatest width slightly caudad of mesal point. Tegmina very delicate; with (six sinistral, seven dextral) longitudinal discoidal sectors; cross-veinlets very weak, except in area of dextral tegmen concealed when at rest, where they are decided. Wings very delicate; proximal (eight) costal veins rather heavily clubbed distad; ulnar vein with (four) complete branches; intercalated triangle small. Abdomen with dorsal surface unspecialized.

Supra-anal plate strongly transverse; weakly triangularly produced, with immediate apex bilobate.[74] Concealed genitalia: a very slender and elongate genital hook is situated dextrad, bent sharply dextrad at the extremely slender, straight distal portion. Subgenital plate produced, roughly scoop-shaped, convex, except latero-distad and meso-distad where it is moderately concave; lateral margins convex before the cercal bases, thence feebly concave and strongly convergent to the distal margin, which is truncate and not more than half as long as the concave portion of one of the lateral margins; two moderately convergent, weakly convex ridges extend from meso-laterad on the plate to the extremities of the distal margin; this margin is occupied by minute, rounded, sub-trigonal styles, directed dorsad and with length of each slightly less than its basal width; at the internal bases of each of these styles, on the internal surface of the subgenital plate, is situated a minute spine, curving feebly dorso-caudad to the aciculate apex, which projects above the adjacent style; immediately cephalad of this spine is situated another similar spine, which curves feebly dorso-cephalad.

Limbs slender. Cephalic femora with ventro-cephalic margin supplied with a series of moderately stout, elongate, proximal spines, which decrease gradually in length to two much longer distal spines, of which the more distal is the longer. Tarsi very elongate; four proximal joints each supplied disto-ventrad with a small pulvillus, which is produced to an acute apex, the shortest (fourth) joint alone has its ventral surface fully occupied by the pulvillus. Moderately large arolia present. Tarsal claws specialized; internal flange well developed, with (two or three) relatively decided but minutely microscopic teeth distad.

General coloration buffy, tinged with tawny olive. Head buffy; with two feeble vertical lines on vertex, a broader band between the eyes and a narrower band, con-

[73] This specimen was unfortunately killed after having very recently reached maturity. The chitin had not fully hardened, and, in consequence, the head is distinctly crushed, while the coloration is clearly more dilute than would be the case in a thoroughly hardened example.

[74] This is probably due to individual variation.

vex ventrad, between the ocelli, of prout's brown.[75] Pronotum with disk light buff, tinged with warm buff, pictured with delicate lines and small blotches of dresden brown and dots of mummy brown,[76] marginal portions hyaline, with a faint buffy tinge. Tegmina and wings hyaline, with a faint buffy tinge;[77] area of dextral tegmen concealed when at rest, with veins and cross-veinlets very weakly tinged with buckthorn brown. Dorsal surface of abdomen dark prout's brown, with punctations and lateral margins warm buff and surface shading to warm buff meso-cephalad. Supra-anal plate warm buff, broadly suffused with prout's brown meso-laterad. Cerci warm buff, washed with prout's brown at immediate bases. Ventral surface of insect, including limbs, warm buff, narrowly margined laterad with mummy brown from neck to base of subgenital plate; tibiae and tarsi flecked with mummy brown.

Length of body, 10.5; length of pronotum, 2.8; width of pronotum, 3.6; length of tegmen, 12.1; width of tegmen, 3.6 mm.

The type is unique.

Neoblattella panamae new species (Plate III, figure 12.)

The present species is distinctive in the specialization of the male subgenital plate, which shows somewhat closer general similarity to that of *N. acanthastylata*, here described, than to any of the other known species of the Impar Group.

We would further note that the interocular space is very slightly but distinctly wider than in any other species of the Impar Group here considered, while the proportions of the maxillary palpi differ and the tegminal cross-veinlets are more conspicuous and numerous, these appearing as far proximad as the median portion of the anal field.

Type.— ♂; Rio Trinidad, Panama. March 19, 1912. (A. Busck.) [United States National Museum.]

Size and form as in *acanthastylata*. Interocular space extremely wide for the Group, very slightly narrower than that between the antennal sockets;[78] ocellar

[75] This type of coloration is apparently developed in all the the species of the Impar Group, though individually varying from obsolete (maximum recessive) to strongly defined (intensive). Insufficient material is at hand to determine whether, in different species, different degrees of recession or intensification are normal.

[76] This pattern is generally similar to that of *Cariblatta fossicauda* Hebard. Trans. Am. Ent. Soc., xlii, pl. xii, fig. 18, (1916).

[77] The recently emerged condition of the specimen is particularly evident in these organs. When fully hardened, the tegmina would doubtless be tinged with buckthorn brown, as in all the related forms.

[78] In one male paratype narrower, about four-fifths as wide as that between the antennal sockets.

spots small. Inter-ocular-ocellar area deplanate, weakly defined. Maxillary palpi very elongate; fourth joint about four-fifths as long as third, fifth about two-thirds as long as fourth, shaped as in *acanthastylata*. Pronotum as in *acanthastylata*. Tegmina delicate; with (eight sinistral, eight dextral) longitudinal discoidal sectors; cross-veinlets distinct throughout tegmen, even appearing in distal portion of anal field. Wings delicate; proximal (seven) costal veins briefly but heavily clubbed distad; ulnar vein with (four[79]) complete branches; intercalated triangle small.

Supra-anal plate simple, about one-quarter as long as basal width, free margin broadly convex between cerci with an indentation feebly indicated mesad. Concealed genitalia: dorso-dextrad is a small chitinous lobe with distal surface covered with minute knobs; beneath this is a very elongate slender process, its chitinous apex straight, aciculate, and just before the apex is situated another straight chitinous aciculate projection also directed caudad; beneath this but springing from the sinistral portion of the anal chamber is a very small slender chitinous process with aciculate apex curved dorsad and dorsal margin with two other sharp projections; genital hook of the usual form found in the genus.

Subgenital plate generally symmetrical; free margin on each side slightly thickened and straight to median fourth, where a sudden brief declivity occurs on each side, the remaining median portion of the plate weakly chitinous with margin straight, transverse. The sudden brief declivent portion of the margin sinistrad is occupied dorsad by a minute, simple, very feebly articulate style, which is cylindrical, feebly curved sinistrad and feebly tapering to the rounded apex, with length not three times its basal width; adjacent to this style and occupying the remaining ventral portion of the sinistral declivent portion of the margin is another chitinous projection of very little thickness, which curves dorso-caudad, tapering to its acute apex which reaches exactly as far as the apex of the style, this process armed at its base with one, and along its internal margin with a few (three to five in the series) minute, short but heavy spines. Dextrad the same specialization is found, these processes being, however, slightly smaller, the armed process having usually one less spine. Limbs, armament of same, pulvilli, tarsal claws and arolia as given for *acanthastylata*.

Allotype.— ♀ ; Porto Bello, Panama. February 15, 1911. (A. Busck.) [United States National Museum.]

This sex very closely resembles females of *N. fratercula* Hebard, *N. impar* here described and probably *N. acanthastylata* here described. We would note that apparently the features of difference, though admittedly not of the differential value usually found, are the abundance of tegminal cross-veinlets, as in the male sex of this species, and the interocular space, which is slightly less than that between the antennal sockets, in this feature very slightly greater than in the females of the

[79] In the paratypes, three to four.

other species.[80] In other respects this sex agrees with the description of the female allotype of *N. chagrensis*, given in the present paper.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	11	2.65	3.65	11.3	3.5
Paratype	10	2.55	3.6	11.1	3.3
Paratype	11.5	2.7	3.6	11.8	3.7
♀					
Allotype	10.8	2.8	3.8	11.8	3.3

The coloration agrees closely with the color description given for *chagrensis* under that species, the only difference being that the head markings are obsolete or subobsolete in the present material. The immature example at hand agrees fully with the adults in coloration.

In addition to the type and allotype the following material is at hand, of which the adults are designated paratypes.

Rio Trinidad, Panama, III, 29, 1912, (Busck), 1 juv.; V, 7, 1911 and VI, 6, 1912, (Busck), 2 ♂.

Neoblattella impar[81] new species (Plate III, figure 13.)

This species should follow *N. panamae* in linear arrangement, the general structure and coloration showing close affinity. The male subgenital plate is, however, of a type in no way comparable to that found in any of the species of the present genus before us, or indeed in any of the forms of the Blattellites.

Type.— ♂; Tabernilla, Canal Zone, Panama. (A. H. Jennings.) [United States National Museum.]

Size and form much like that of *N. acanthastylata.* Inter-ocular-ocellar area deplanate, weakly defined; interocular space moderately wide, four-fifths as wide as that between antennal sockets; ocelli small. Maxillary palpi very elongate, third and fourth joints subequal in length, fifth (distal) joint about two-thirds as long as fourth, enlarged, obliquely truncate to near its base, appreciably more elongate than in *N. acanthastylata.* Pronotum as in *panamae.* Tegmina delicate; with (six to nine, usually seven) longitudinal discoidal sectors; cross-veinlets very weak, except distad and in area of dextral tegmen concealed when at rest, where they are more distinct.

[80] The very slight degree of difference in this feature is realized when we consider that the otherwise similar female of *N. chagrensis*, here described, has the interocular space appreciably narrower than in any of the species here referred to, though in that insect its width is four-fifths that between the antennal sockets.

[81] In allusion to the remarkable, and exceedingly asymmetrical, male subgenital plate.

Wings delicate; proximal (six) costal veins briefly but heavily clubbed distad; ulnar vein with (five[a]) complete branches; intercalated triangle small.

Supra-anal plate with proximal portion not broad, transversely concave, small meso-distal portion strongly deflexed with surface convex; lateral margins nearly straight, almost transverse, weakly oblique to mesal third of area between cerci, there concave, forming the lateral margins of the produced area, which is subrectangulate, slightly wider than long, with disto-lateral angles broadly rounded and distal portion sub-bilobate.

Concealed genitalia: within the anal chamber and next to the subgenital plate lies a very large, roughly circular, subchitinous mass, concealing the genital hook and surrounding specialized plates; sinistrad above this is a smaller subchitinous plate from which projects a delicate aciculate chitinous process which curves strongly sinistrad; dextrad above the same mass a very elongate, aciculate, feebly undulating chitinous process is directed across the distal portion of the anal chamber, reaching the base of the sinistral style; the paired plate beneath the supra-anal plate is large and simple.

Subgenital plate convex; free margin remarkably asymmetrical, truncate; free margin sinistrad, beyond sinistral cercus, produced in a small, bulbous, acute-angulate process, bearing distad a small cylindrical process, about twice as long as broad, with apex rounded, supplied on its dextral (internal) face with minute, microscopic, chitinous spinulae, from this process to the base of the cercus the free margin is straight, weakly oblique, heavily supplied with larger, microscopic, chitinous spinulae, there produced in a very slender, nearly straight process, about as long as the cercal width, which lies dextrad along the free margin, from the dextral base of this process the margin is continued, straight, weakly oblique, almost to the mesal point, where a sudden and very deep emargination causes this portion to form a large acute-angulate process with apex sharply rounded, directed dextrad, from the base of this angulation the margin is weakly concave, very slightly oblique at the slightly produced dextral extremity, before the dextral cercus, where an acute-angulate projection with apex bluntly rounded and deflexed occurs, its latero-dextral margin straight to base of subgenital plate. Limbs, armament of same, pulvilli, tarsal claws and arolia as given for *acanthastylata*.

Allotype.— ♀ ; Alhajuela, Panama. May 3, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with the allotypic female of *panamae*, differing in the cross-veinlets of the tegmina, which are much less conspicuous and are confined to the distal portions. Close resemblance to females of *N. fratercula* Hebard is also found, the female of the present insect differing in its larger size and darkened distal veinlets of the tegmina and wings. The great difficulty in separating females of the present group of species is discussed under the allotypic description of the preceding species, *panamae*.

[a] Four in other specimens.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *paratype*	10.2	2.8	3.3	11	3.2
Alhajuela, *paratypes* (5)	9.4–11	2.8–2.9	3.5–3.8	11.7–12	3.4–3.7
Tabernilla, *type*	11.1	2.9	3.8	12.2	3.7
Rio Trinidad, *paratype*	11	2.8	3.7	12	3.4
Rio Bejuco, *paratype*	11.2	2.9	3.8	11.8	3.6
♀					
Alhajuela, *allotype*	11	3	4	12.5	3.9

General coloration buffy, tinged with buckthorn brown. Head buffy with four vertical lines on occiput, a moderately broad band between eyes, a moderately broad band, convex ventrad, between ocelli and face maculate with blackish brown.[83] Pronotum with disk ochraceous-buff, with suffusions and picturing of tawny and dots of mars brown; in other individuals, instead, chestnut brown and prout's brown: pattern of the same general type as that found in *acanthastylata*. Tegmina transparent, buckthorn brown; area of dextral tegmen concealed when at rest, with veinlets dresden brown. Wings hyaline, with a very faint brownish tinge, this decided, prout's brown, in narrow area between intercalated triangle and axillary vein; area of distal portion of costal veins buffy in type, this only weakly indicated as a very narrow suffusion, proximad of the enlarged apices of the costal veins, in other specimens; radiate field in some lights distinctly iridescent, as in all other species of the Impar Group before us. Dorsal surface of abdomen ochraceous-buff, washed with cinnamon brown, this deepening to mummy brown distad. Cerci ochraceous-buff, bases and medio-distal joints washed with mummy brown. Ventral surface and limbs ochraceous-buff,[84] with a striking shining black maculation proximo-mesad on the abdomen.

Several specimens before us are of recessive coloration, in these the facial markings, normally decided in this species, are weakly defined or subobsolete. The delicate pronotal markings likewise show reduction in both extent and intensity in these examples.

In addition to the type and allotype, the following series is considered paratypic.

Porto Bello, Panama, II, 15, 1911, (Schwarz), 1 ♂.
Alhajuela, Pan., IV, 9 to 17, 1911, (Busck), 5 ♂.
Rio Trinidad, Pan., III, 19, 1912, (Busck), 1 ♂.
Rio Bejuco, Pan., (Schaus), 1 ♂.

[83] Several specimens before us have the head somewhat discolored in drying, the markings probably more suffused than in life, the small ocelli now not strikingly pale.

[84] The limbs are clearly discolored, ochraceous tawny, in the type.

Neoblattella chagrensis[85] new species (Plate III, figure 14.)

This species belongs to the second division of the Impar Group, having, in the male, a simple type of subgenital plate, with simple cylindrical styles and lacking accessory specialized appendages. The concealed genitalia, however, show high specialization, and in several closely related tropical North American species before us,[86] aside from differences in size, pronotal proportions and development of tegmina and wings, the concealed genitalia alone afford conspicuous diagnostic characters in the very distinctive development found in each. The very remarkable fact is that, in all of these species, the male subgenital plate and styles are the same in form and proportions, whereas in all the other very numerous species of the genus before us, the male subgenital plate and styles, in every case, show remarkable and constant differential characters.

Only two species of the Impar Group, having the distal tegminal cross-veinlets strikingly darkened, have been described; one of these, *brunneriana* (Saussure),[87] from Mexico,[88] the other, *albida* (Saussure),[89] from Colombia. Unfortunately, though in general

[85] In reference to the type locality of the species, situated in the Chagres River drainage.

[86] These other species are, apparently, yet undescribed.

[87] **Neoblattella brunneriana** (Saussure)

1868. *Blatta brunneriana* Saussure, Rév. et Mag. de Zool., 2e sér., xx, p. 78. [♀; [Cordillera Oriental], Mexico.]

1870. *Blatta brunneriana* Saussure, Miss. Sci. Mex., Rech. Zool., Orth., p. 32, pl. i, fig. 20. (More complete discussion of type.)

Type, ex Saussure: length of body, [1] 2; length of body and tegmen, [1] 6; length of pronotum, 3; width of pronotum, 4 mm.

[88] We find that our diagnosis given for the previously undescribed male of *brunneriana* (Ent. News, xxvii, p. 159, footnote 3, (1916)), unfortunately does not apply to that species, but to a related, distinctive, undescribed species. The material then supposed to represent *brunneriana* (Ent. News, xxvii, p. 159, footnote 1) includes several undescribed species of the Impar Group.

[89] **Neoblattella albida** (Saussure)

1869. *Blatta albida* Saussure, Rév. et Mag. de Zool., 2e sér., xxi, p. 110. [♂; Bogotá, [Colombia].]

1870. *Blatta albida* Saussure, Miss. Sci. Mex., Rech. Zool., Orth., p. 37. (More complete discussion of type.)

Type, ex Saussure: length of body, 10.2; length of tegmen, 12.5; length of pronotum, 2.6; width of pronotum, 3.8 mm.

fully described, the specific diagnostic features of greatest value can not be determined for *brunneriana* and in *albida* are inadequately treated.

The Mexican species is distinctly larger, with more elongate tegmina and wings, than the species here described. The Colombian species is apparently very close, though nothing of value is stated for the genitalia, and we feel justified in describing the Panamanian material as distinct, only because we have evidence that the Impar Group splits up into an exceptional number of species, each in distribution probably confined to a relatively very limited area.

Type.—♂; Gatun, Canal Zone, Panama. July 15 to 31, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 434.]

Size medium for the group, similar to that of *N. acanthastylata* here described and *N. albida;* form rather slender, as in those species. Interocular space relatively very narrow, distinctly less than half as wide as that between antennal sockets; ocellar spots small but distinct. Maxillary palpi and pronotum much as in *acanthastylata*. Tegmina delicate; with (six sinistral, eight dextral) longitudinal discoidal sectors; cross-veinlets heavy distad and in area of dextral tegmen concealed when at rest. Wings delicate; proximal (seven) costal veins briefly but heavily clubbed distad; ulnar vein with (three) complete branches; intercalated triangle small. Abdomen with dorsal surface unspecialized.

Supra-anal plate strongly transverse, weakly triangularly produced with apex broadly rounded. Concealed genitalia: from below base of sinistral cercus a moderately broad, flattened, cylindrical, chitinous process extends caudad, curving dorso-dextrad, with distal portion slightly widened, rounded in outline, but armed at apex with a spine curved strongly dextro-ventrad to its straight, aciculate apex and below this armed with a similar spine curved ventrad.

Subgenital plate weakly asymmetrical, due to a very slightly greater production of the plate toward the sinistral style; weakly convex proximad, deplanate mesodistad, with latero-distal portions moderately reflexed; lateral margins nearly straight, subsinuate to apices of latero-distal reflexed portions, there sharply convex-declivent in brief distance to medio-distal deplanate area, the distal margin of which is moderately convex; styles situated in the angles thus formed, simple, elongate, cylindrical, with apices rounded, each showing a feeble outward laterad curvature and about four times as long as wide, in length each equalling half the distance between their bases. Limbs and their armament, pulvilli and arolia, as given for *acanthastylata*. Tarsal claws specialized; internal flange well developed, with (four to six) relatively decided but minutely microscopic teeth distad, showing slightly greater specialization than in *acanthastylata*.

Allotype.— ♀ ; same data as type, but taken July 28 to August 5, 1916. [Hebard Collection.]

Agrees with male except in the following features. Size somewhat larger. Interocular space about four-fifths as wide as that between antennal sockets. Tegmina and wings slightly more elongate.[90] Supra-anal plate moderately transverse, weakly triangularly produced, with apex strongly but irregularly concave emarginate. Subgenital plate scoop-shaped, with meso-distal portion narrow and strongly produced; lateral margins briefly straight to bases of cerci, there convex declivent, with margin of declivent portions somewhat thickened and armed with numerous, minute, stout, chitinous spines, biseriately arranged; from the distal extremities of these declivent portions, the lateral margins are straight and convergent to near the narrow apex, where they curve briefly and weakly ventrad to their juncture.

General coloration buffy, tinged with buckthorn brown. Head buffy, with two vertical lines on occiput, a broad band between eyes, a narrower band, convex ventrad, between ocelli and maculations on face of blackish brown;[91] ocelli small, pale buffy, striking.[92] Pronotum with disk pictured and dotted much as in *acanthastylata*, but these markings are more obscured, since, in the present material, the disk is much suffused with cinnamon brown; marginal portions hyaline, with a faint buffy tinge. Tegmina transparent, buckthorn brown, with cross-veinlets distad and in area of dextral tegmen, concealed when at rest, conspicuously darkened.[93] Wings hyaline, with a very faint brown tinge, veins buckthorn brown, with enlarged apices of costal veins cinnamon brown, while proximad of these a very faint and narrow buffy suffusion is appreciable. Dorsal surface of abdomen and cerci as in *N. impar*. Ventral surface buckthorn brown, limbs ochraceous-buff, with inconspicuous dots of dresden brown to prout's brown on tibiae and tarsi; ventral surface of abdomen with an irregular proximal suffusion of blackish brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *type*	10.3	2.7	3.7	11.7	3.4
Gatun, *paratype*	9.7	2.6	3.4	11.3	3
♀					
Porto Bello, *paratype*	12	3.1	4	11.7	3.7
Gatun, *allotype*	12.3	2.8	3.8	12.6	3.7

In addition to the type and allotype, the following paratypes are at hand.

[90] Tegmina with seven sinistral and six dextral discoidal sectors; wing with ulnar vein showing four branches.

[91] These markings are very weak and suffused in the male, clear cut and distinct in the female.

[92] The pale ocelli often become discolored and almost indiscernable in dried material. This is true of the female before us.

[93] This is more decided in the male before us, in which these veinlets are prout's brown.

Porto Bello, Panama, IV, 21, 1912, (Busck), 1 ♀.
Gatun, Canal Zone, Pan., IV, 7, 1911, (Jennings), 1 ♂.

Neoblattella nahua (Saussure) (Plate III, figure 15.)

1868. *Blatta nahua* Saussure, Rév. et Mag. de Zool., 2e sér., xx, p. 355. [♂, ♀, Mexico.]

1893. *Blatta nahua* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 42, pl. iv, figs. 19, 20 and 21. [♂, ♀; Atoyac, Vera Cruz and Tabasco, Mexico.]

The present species bears a very close general resemblance to *N. adspersicollis* (Stål), genotype of *Neoblattella*, these being the largest known species of the genus. The unusual specialization of the dorsal surface of the male abdomen leads us to assign it to a different group, here designated as the Nahua Group, of which the smaller but similarly specialized and broad *N. fraterna* (Saussure and Zehntner) is the only other member known to us.[94]

This abdominal specialization may be described as follows.[95] Fifth dorsal abdominal segment with lateral portions produced, lateral surface concave with outer margin folded up and over the outer portion of the concave area, thus forming a partially inclosed pocket on each side; sixth segment with surface subchitinous mesocaudad, there, in a small area, with caudal margin concave, leaving exposed only a brief area of the similarly subchitinous and elsewhere concealed seventh segment; eighth segment with narrow distal portion alone visible, margin showing a small indentation opposite either cercal base, also weakly chitinous mesad; the brief median portion of this segment, minute exposed portion of seventh and all but the lateral margins of the sixth segments supplied with scattered hairs.

Porto Bello, Panama, II, 15 to III, 15, 1911, (Busck), 1 ♂, 1 juv. ♂, 1 juv. ♀.
Rio Boqueron, Pan., V, 1907, (Busck), 1 ♀.
Alhajuela, Pan., IV, 17, 1911, (Busck), 1 ♂, 1 juv. ♀.
Taboga Island, Pan., VI, 9, 1911, (Busck), 1 ♀.

The male from Alhajuela is unusually small: length of body, 15.5; length of pronotum, 3.8; width of pronotum, 5; length of tegmen, 16.8; width of tegmen, 5 mm. A considerable series of the species from tropical North America at hand is decidedly con-

[94] In *adspersicollis* the dorsal surface of the male abdomen is unspecialized; that species is found in tropical South America, while *nahua* ranges from tropical Mexico to Panama.

[95] Saussure and Zehntner's figure, in the Biologia, Orthoptera i, pl. iv, fig. 19, shows this feature, but only in a superficial manner.

stant in size and development of the organs of flight. The specimen from Taboga Island, however, though of the usual large size shows moderate tegminal and wing reduction (length of tegmen, 16; width of tegmen, 5.4 mm.).

Neoblattella fraterna (Saussure and Zehntner) (Plate III, figure 16.)

1893. *Blatta fraterna* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 44. [♂; Chontales, Nicaragua.]

Gatun, Canal Zone, Panama, IV, 7, 1911, (Jennings), 1 ♂, 1 juv. ♀; VII, 17 to VIII, 22, 1916, (Harrower), 3 ♂, 2 juv. ♂, 3 juv. ♀, 3 small juv.
Rio Boqueron, Pan., V, 1907, (Busck), 3 ♀.
Tabernilla, C. Z., Pan., VI, 16 and 25, 1907, (Busck), 1 ♂, 1 ♀.
Cabima, Pan., V, 17 to 20, 1911, (Busck), 3 ♀.
Calidoma Road, Pan., IV, 12, 1911, (Jennings), 2 juv.

The present species is a member of the Nahua Group. The young of this insect, which in the adult condition is plainly colored, are strikingly and distinctively marked. The pronotum, mesonotum and metanotum are buffy, with two narrow adjacent medio-longitudinal lines of dark brown, and on each side the broad translucent margins are bordered internally by bands of dark brown, which are slightly narrower than the marginal portions, the intervening buffy bands thus formed showing scattered dark brown dots. The dorsal surface of the abdomen is blackish brown, punctate to varying degrees with buffy.

LOPHOMETOPUM[96] **new genus**

The present genus shows unquestionable affinity to *Neoblattella* Shelford in form and general structure, and particularly in the differentiated pulvilli and specialized tarsal claws. Nearest affinity to the Carrikeri Group of that genus is shown.

From *Neoblattella* it is possible to separate *Lophometopum* by the distinct interocular ridge and the "type B" armament of the ventro-cephalic margins of the cephalic femora. The coloration of the tegmina and wings in the only known species of the genus is of a type previously unknown to us.

In linear arrangement this genus follows *Neoblattella* and precedes *Blattella* Caudell; the latter genus is of Old World origin and distantly related.

[96] From λόφος = ridge, and μέτωπον = forehead. In allusion to the striking transverse ridge between the eyes.

The genus is monotypic. GENOTYPE: *Lophometopum leptum* new species.

Generic Description.—Size medium, form slender, structure extremely delicate for the Group Blattellites. Interocular space narrow, formed by a low but striking transverse rounded ridge; the vertex and inter-ocular-ocellar areas in very different planes, the latter small, feebly concave, rounding broadly laterad; ocellar spots obsolete (possibly distinguishable in fresh material); face broad and moderately convex with lateral margins parallel to clypeal suture. Eyes prominent dorso-laterad, not extending ventrad below the antennal bases. Maxillary palpi very elongate; distal joint short, much shorter than the preceding joints.

Pronotum transverse; disk feebly convex, showing transverse impressions cephalad and latero-caudad; lateral margins broad and scarcely declivent. Tegmina and wings fully developed. Tegmina with discoidal sectors longitudinal. Wings with costal veins weakly clubbed, ulnar vein with complete branches, intercalated triangle small but distinct. Dorsal surface of male abdomen unspecialized, subgenital plate symmetrical.

Limbs extremely long and slender for the Group Blattellites. Ventro-cephalic margin of cephalic femora armed with (three to five) elongate (relatively slender for the Group) spines, which are elongate proximad but rapidly decrease in length distad, succeeded by a row of well-spaced minute chaetiform spines,[97] terminating distad in two elongate spines, the more distal the longer. Ventro-caudal margin of cephalic femora armed with (three and one distal) elongate and moderately heavy spines; other ventral femoral margins well supplied with elongate and moderately heavy spines. Ventral surfaces of four proximal tarsal joints supplied distad with small pulvilli, the apices of which are produced, filiform, as in *Neoblattella*. Tarsal claws with a heavy internal flange, its margin serrate. Delicate arolia present.

Lophometopum leptum new species (Plate IV, figures 1 to 6.)

This is a really beautiful insect, due to the high polish of its dorsal surface, its delicate structure and pale brown coloration with

[97] It is clear that, though this armament is "type B", the decided and rapid reduction in length of the proximal heavy spines and the unusually wide spacing of the more distal chaetiform spines show some convergence toward "type A."

a broad band of darker brown crossing the tegmina, when at rest, in their meso-distal portion. We know of no other species of similar coloration.

Type.— ♂; Gatun, Canal Zone, Panama. (A. H. Jennings.) [United States National Museum.]

Supplementing the generic features here given, we would note the following for this species. Interocular space approximately two-fifths as wide as that between the antennal sockets. Maxillary palpi with third and fourth joints subequal in length, each about twice as long as interocular width, fifth joint small, enlarged, slightly over half as long as fourth joint.

Pronotum broad oval, with cephalic margin moderately flattened and caudal margin broadly flattened, showing a very feeble convexity. Tegmina very elongate, the median third with margins parallel. the sutural margin showing the greater convergence distad, the rather sharply rounded apex slightly nearer the costal margin; discoidal sectors (seven) regular. Wings moderately broad; the moderately elongate costal veins with distal half moderately enlarged, the clubs (seven) resultantly very elongate; ulnar vein with (four) complete branches, these and the discoidal and median veins connected by weak transverse veinlets; intercalated triangle over half as broad as long.

Supra-anal plate with length approximately two-fifths proximal width, triangularly produced, rectangulate emarginate distad, the apices thus formed broadly rounded and supplied with a few long hairs, as is the distal portion of the abdomen and the cerci. Cerci with (eleven) distinct joints, each with lateral margins convex, this convexity sharp proximad and distad beyond the proximal segments except in the apical segment which is slender and cylindrical; dorsal surface of cercus feebly convex, ventral surface with segments moderately convex and strongly cingulate laterad.

Concealed genitalia: the paired plate beneath the supra-anal plate is reduced, very delicate, the caudal face of each half convex; the remaining organs within the anal chamber are withdrawn and can not be seen in the type.

Subgenital plate scoop-shaped, symmetrical; lateral portions vertical, margins straight, parallel, weakly declivent, distad rounding broadly ventrad into distal two-thirds of free margin which is transverse, with a small rounded ridge on each side dorsad, each occupying one-third of this section of the free margin; from sockets at the angles formed by the lateral and mesal portions of the plate spring the similar, heavy, cylindrical styles, directed dorsad and feebly caudad, three times as long as wide, their apices subchitinous dorso-caudad, each supplied dorso-cephalad with two minute uncinate teeth which curve over the soft areas.

Head shining, ochraceous-buff; eyes and a broad interocular band blackish brown. Limbs and spines immaculate ochraceous-buff. Ventral surface of abdomen shining blackish brown, except narrowly proximo-laterad where it is ochraceous-buff. Pronotum shining; disk ochraceous-tawny with three very inconspicuous pairs of darker flecks, lateral margins transparent faintly tinged with brown. Tegmina transparent, faintly tinged with brown except in penultimate fifth, where the areas

exposed when at rest are translucent prout's brown in a broad transverse band, beyond this the tips are transparent, very faintly tinged with brown; portion of dextral tegmen concealed when at rest, faintly tinged with brown, the transverse dark band there fading out rapidly. Wings transparent, faintly tinged with brown, except in area of enlarged portions of costal veins which is prout's brown, this area, when tegmina and wings are at rest, lying beneath the dark transverse tegminal band. Dorsal surface of abdomen buffy, supra-anal plate with all borders washed with prout's brown. Cerci buffy, except first and last joints, which are prout's brown.

Length of body, 9.5; length of pronotum, 2.8; width of pronotum, 3.8; length of tegmen, 12.1; width of tegmen, 3.75; length of caudal femur, 4.45; length of caudal tibia, 5.7; length of caudal tarsal joints, 3.3; length of cercus, 3.1 mm.

In the immature condition the coloration is very similar, except that the dorsal surface of the abdomen is prout's brown laterad in the distal half, this increasing to the supra-anal plate and cerci which are entirely of that color.

In addition to the type we have two immature examples, taken by A. H. Jennings on the upper Rio Pequeni, Chagres Basin, Panama.

Blattella germanica (Linnaeus) (Plate V, figure 16.)

1767. [*Blatta*] *germanica* Linnaeus, Syst. Nat., ed. XII, p. 668. [Denmark.]

Gatun, Canal Zone, Panama, VIII, 6 to 22, 1916, (Harrower), 1 ♀; (Jennings), 1 ♂.

Tabernilla, C. Z., Pan., V, 9, 1907, (Busck), 1 ♀.

Ancon, C. Z., Pan., I, 12, 1911, (Busck), 1 ♀; (Jennings), 1 ♀.

Ischnoptera nox new species (Plate IV, figure 7.)

The present species shows a somewhat intermediate condition between the known forms of the Morio and Rufa Groups. The black coloration suggests the known species of the former, while the subchitinous area of the male supra-anal plate is more extensive than in any of the known species of the Rufa Group, though by no means as large or as highly developed as in the known species of the Morio Group.

From the sum of the characters observed we place *nox* in the Rufa Group, after *vulpina* Hebard and before *rufa rufa* (De Geer). The tegmina and wings are somewhat more elongate than in *rufa rufa*, much as are frequently found in *rufa occidentalis* Saussure, but proportionately not as elongate as in *vulpina*. The distinctive male supra-anal plate is clearly a further development of the type found in *rufa rufa*, the subgenital plate in this sex closely resembles

the type found in *rufa debilis* Hebard.[98] Females are distinguished by their general black coloration and decidedly smaller size than those of the known species of the Morio Group.

Type.— ♂; Porto Bello, Panama. April 20, 1912. (A. Busck.) [United States National Museum.]

Size medium large; form moderately stout, slightly more slender than is normal in *rufa rufa*. Interocular space rather narrow, about two-thirds as wide as that between the ocelli, about one-third as wide as that between the antennal sockets. Ocelli large and distinct, flattened surfaces of ocellar areas forming a rather sharp angle with inter-ocular-ocellar area, in this respect agreeing more closely with *I. morio* Burmeister. Maxillary palpi rather short; fourth joint slightly shorter than third and but two-thirds as long as fifth (distal) joint, much as in *morio*. Latero-caudal sulci of pronotal disk distinct. Tegmina and wings fully developed, much as in *rufa rufa*, tegmina more slender, portion of dextral tegmen concealed when at rest, not strikingly transparent. Wings suffused, with veins dark. Dorsal surface of abdomen specialized as is characteristic for the genus.[99]

Supra-anal plate produced, with lateral margins moderately convergent to median portion (over one-third of whole) where the greatest production occurs, this portion not as broad as in *rufa rufa*, the margin there being convex and supplied with long hairs, the entire surface subchitinous to and including the caudal margin, thus forming a broad transverse oval.

Concealed genitalia: titillator alone visible; elongate, with dextral margin straight, sinistral margin convex, widening from narrow proximal portion and then tapering to the straight acute apex, entire surface thickly covered with minute short teeth directed distad.

Subgenital plate strongly asymmetrical, surface convex except at produced portion where it is moderately concave; produced portion semicircular; sinistral style situated at sinistral base of produced portion, unspecialized, straight, elongate, conical, about three times as long as width at its slightly enlarged base; dextral style situated slightly sinistrad of mesal point on margin of produced portion, directed rather strongly sinistrad in thick basal portion, mesad bent more strongly sinistrad with distal portion conical and armed with a number of straight spiniform teeth.

Allotype.— ♀; Tabernilla, Canal Zone, Panama. (A. Busck.) [United States National Museum.]

Agrees with male in ambisexual characters, differing in the following features. Size slightly larger, form appreciably broader with pronotum more ample. Interocular space very slightly wider than that between the ocelli. Ocellar areas not fully as sharply defined. Tegmina and wings proportionately fully as elongate as in the male, well surpassing the cercal extremities. Supra-anal plate with margin very feebly concave at cercal bases, between these triangularly produced with apex

[98] Figured, Trans. Am. Ent. Soc., xlii, pl. xvi, fig. 6, (1916).

[99] See Hebard, Mem. Am. Ent. Soc., 2, p. 62, (1917).

bluntly rounded,[100] briefly subchitinous meso-distad, length nearly half proximal width. Subgenital plate convex, very broad, with free margin evenly and very broadly convex, truncate mesad.

Head blackish brown, ocelli and mouth-parts buffy, maxillary palpi with distal joint darkened. Limbs buffy. Ventral surface of abdomen blackish brown. Pronotum blackish brown. Tegmina translucent, dark chestnut brown, becoming slightly paler distad; portion of dextral tegmen concealed when at rest, transparent and slightly paler. Wings transparent, with a faint tinge of brown, the entire area of the costal veins chestnut brown, other principal veins and connecting veinlets chestnut brown. Dorsal surface of abdomen chestnut brown, paler proximad. Cerci dark chestnut brown.

A paratypic female differs in having the mouth-parts all darker, the limbs dark chestnut brown.

Measurements (in millimeters)

	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tarsal joints
♂, Porto Bello, *type*...	14	3.4	4.5	15	3.9	4.3
♀, Tabernilla, *allotype*.	17.2	4.6	5.7	17	4.7	5.3
♀, Chorrera, *paratype*.	16.7	4.8	5.8	17.3	4.9	4.7

In addition to the type and allotype, a paratypic female is at hand, taken at Chorrera, Panama, on May 17, 1912, by A. Busck.

Ischnoptera rufa rufa (DeGeer) (Plate IV, figure 8.)

1773. *Blatta rufa* DeGeer, Mem. l'Hist. Ins., iii, p. 539, pl. 44, fig. 7. [Surinam.]
1916. *Ischnoptera rufa rufa* Hebard, Trans. Am. Ent. Soc., xlii, p. 346, pl. xvi, figs. 3 and 4. [Detailed discussion.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 22, 1916, (Harrower), 1 ♂, 3 ♀.
Lion Hill, C. Z., Pan., VII, 28, 1907, (Busck), 1 ♂.
Alhajuela, C. Z., Pan., III, 4, 1912, (Busck), 1 ♀.
Tabernilla, C. Z., Pan., VI, 20 to VII, 31, 1907, (Busck), 2 ♂, 1 ♀.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under débris on edge of jungle), 1 juv. ♂.
Zone limit five miles west of Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♂.
Paraiso, C. Z., Pan., IV, 24, 1911, (Busck), 1 ♀.
Corozal, C. Z., Pan., IV, 26 and 27, 1911, (Busck), 3 ♂.

[100] A paratypic female at hand has the supra-anal plate with apex truncate. Such variation in the female supra-anal plate appears to be general in the group and led Saussure and Zehntner to describe *conformis*, a synonym of *rufa occidentalis* Saussure, based on this feature of difference. This is well shown in figures 24 and 25 of plate iii, Biol. Cent.-Am., Orth., i, both of which represent examples of *rufa occidentalis* Saussure. We unfortunately synonymized *conformis* under *rufa rufa* instead of under *rufa occidentalis* and take the present opportunity to correct this error made in 1916, Trans. Am. Ent. Soc., xlii, p. 346.

Ancon, C. Z., Pan., (Jennings), 1 ♂.
Panama, Pan., 1913, (Zetek), 1 ♂, [United States National Museum].

The present series shows little variation, as is characteristic of the present race. This is in strong contrast with the exceptional amount of individual variation usually found in *rufa occidentalis* Saussure.

Ischnoptera rufa occidentalis Saussure (Plate IV, figures 9 and 10.)

1862. *I[schnoptera] occidentalis* Saussure, Rév. et Mag. de Zool., (2), xiv, p. 170. [♀; New [Orleans, Louisiana].]

1893. *Ischnoptera conformis* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 37, pl. iii, fig. 25. [♀, Nicaragua.]

Tabernilla, Canal Zone, Panama, (Busck), 1 ♂.
Cabima, Pan., V, 19, 1911, (Busck), 1 ♀.
Chorrera, Pan., V, 14, 1912, (Busck), 1 ♀.

These specimens show not only the highest development in the present race as to size, but also in intensification of coloration and in the diagnostic features of the male genitalia. It is therefore evident that we have in Panama no intergradation between *rufa rufa* and *rufa occidentalis*, but instead the most divergent type developed in the latter plastic race, contrasting strongly with the constant *rufa rufa*.

The distribution of *rufa occidentalis* is now known to extend in continental North America from the subtropical regions of the Gulf of Mexico southward to Panama; that of *rufa rufa* from the northeastern portion of South America westward to Panama and northward throughout the West Indies. It is possible that *rufa* originally passed from the West Indies to continental North America, and that the area where intergradation between *rufa rufa* and *rufa occidentalis* would occur no longer exists. If so, we would find in Panama the western limit of the distribution of typical *rufa* and the most southern point reached by *rufa occidentalis*. In this way alone do we feel able to account for the signal differentiation between these two races in the same region. The convergence in the large series of *rufa occidentalis* before us toward typical *rufa* shows definitely that these two types represent races, and nothing more, of one and the same species.

The material here studied of *rufa occidentalis* is in every way similar to specimens from Pózo Azúl, a locality in the southwestern

lowlands of Costa Rica, about ten miles up the Rio Pirrís.[101] This optimum type probably represents an incipient geographic race, but as yet has not reached a sufficient degree of differentiation to warrant nominal recognition.

That the present insect, though not domiciliary, thrives about human habitations under litter of all kinds, must be considered in studying material. It is this factor which increases the possibility of specimens being found adventive and not peculiar to the locality at which they were secured.

The concealed male genitalia in this species are very complex. The genital hook is simple, the titillator specialized distad (plate IV, fig. 9), this specialization more decided in *rufa debilis* Hebard and *rufa occidentalis* than in *rufa rufa*. The paired plate beneath the supra-anal plate is highly specialized on both sides, developed into chitinous lobes and shafts, of which the sinistro-dorsal shows the greatest specialization. The usual development of this shaft is here shown (plate IV, fig. 10). Individual variation occurs in which one or both of the marginal teeth disappear, and in *rufa occidentalis* the shaft occasionally is much broader, or much more elongate and slender. In *rufa occidentalis* the ventral surface of the supra-anal plate frequently bears a large, irregularly rounded, mesal lobe covered with stiff bristles, or is unspecialized as is normal in *rufa rufa*. These features of variability in the male concealed genitalia are a very unusual occurrence in the Blattidae.

Ischnoptera gatunae[102] new species (Plate IV, figure 11.)

The present species belongs to a group of elongate, light brown forms, having the latero-caudal sulci of the pronotal disk well developed and in some of the species distinctively colored. This group we would call the Gatunae Group; it apparently follows the Rufa Group and precedes the Apolinari Group in linear position, the latter coming before the second section of the genus, which includes a number of groups of relatively much smaller species.

[101] For a discussion of this material and the variability of this race, see Hebard, Trans. Am. Ent. Soc., xlii, p. 354, (1916).

[102] The material of this species was taken on the Rio Trinidad, in an area now flooded by Gatun Lake.

When compared with a female of *I. bergrothi* (Griffini),[103] females of this species are found to differ in the narrower interocular space (.5 instead of .7 millimeter in width) and pronotum with disk largely suffused, latero-caudal sulci not distinctively colored and caudal marginal portion transparent. We feel satisfied that when the male sex of *bergrothi* is found, further distinctive features in the genitalia will be noted.

Type.— ♂; Rio Trinidad, Panama. March 7, 1912. (A. Busck.) [United States National Museum.]

Size medium large, form slender. Interocular space narrow (.3 millimeter), about one-third as wide as that between antennal sockets, four-fifths as wide as interocellar space. Ocelli large and distinct, flattened surfaces of ocellar areas forming a moderately sharp angle with interocellar area. Maxillary palpi moderately short; fifth (distal) joint very slightly longer than third. Latero-caudal sulci of pronotal disk pronounced. Tegmina and wings extending beyond apex of abdomen nearly twice the cercal length. Tegmina elongate and narrow, with portion of dextral tegmen, concealed when at rest, transparent though slightly suffused. Dorsal surface of abdomen specialized as is characteristic of the genus.[104]

Supra-anal plate trapeziform produced, with latero-caudal angles rounded and margin between transverse; feebly and irregularly subchitinous in a small median area, just dextrad of which the ventral surface of the plate is produced ventrad in a thick heavy plate with apex rounded.

Paired plate beneath supra-anal plate specialized on each side, the dorsal chitinous arms, of which the dextral is much the longer, each armed with a distal spine; beneath the sinistral of these is a heavy lobiform plate which is heavily spined dorsad, while dextrad is a large chitinous lobe covered with elongate hairs. Titillator very similar to that of *I. rufa occidentalis* Saussure (plate IV, fig. 9).

Subgenital plate hairy, strongly asymmetrical, surface convex except in produced portion, where it is moderately concave; dextral portion of free margin strongly convex to brief median portion of plate, which is weakly triangularly produced; the dextral style at the apex, about twice as long as basal width, tapering slightly to its rounded apex, which is covered dorsad with minute teeth, this style directed sinistrocaudad, so that its dextral margin is an almost even continuation of the dextral margin of the produced portion of the plate; sinistral margin feebly convex, then feebly concave to median produced portion, at the base of which is situated the very small sinistral style, suboval, straight, supplied in distal half of sinistral face with minute teeth, about three-quarters as long as dextral style and situated at a distance from it of slightly less than its own length.

[103] We have two Costa Rican females, apparently of that species, described from a single female from Punta de Sabana, Darien, (Panama).

[104] Described; Mem. Am. Ent. Soc., 2, p. 62, (1917).

Limbs and armament of same as characteristic for the genus. First four caudal tarsal joints supplied distad with moderately well developed simple pulvilli. Small arolia present.

Allotype.— ♀ ; same data as type, but taken March 23, 1912. [United States National Museum.]

This sex differs from the male in the following characters. Size slightly larger, form broader but still very slender for the genus. Interocular width (.5 millimeter) slightly less than that between the ocelli, slightly more than half the width between the antennal sockets. Ocellar areas as sharply defined but angle with interocellar area not as sharp. Tegmina and wings proportionately fully as elongate as in male. Supra-anal plate one-half as long as basal width; lateral margins straight and moderately convergent to mesal third between cerci, there the plate is produced with margins feebly convex convergent to the blunt apex. Subgenital plate moderately convex, very broad, with free margin evenly and broadly convex.

Head dark chestnut brown; ocelli light buff. Antennae mummy brown, except first joint which is ochraceous-buff. Mouthparts, maxillary palpi, limbs and ventral surface of abdomen ochraceous-buff, the latter strongly tinged with cinnamon brown. Pronotum with disk heavily suffused with cinnamon brown in a vague pattern; lateral portions ochraceous-buff, this narrowly invading the disk cephalad of the latero-caudal sulci; caudal portions transparent. Tegmina translucent, dresden brown, the marginal field paler. Wings transparent, area between costal veins dark chestnut brown, shading to cinnamon brown toward the free margin and in the entire distal portion beyond the humeral vein; colorless between the dark chestnut brown principal veins; radiate field slightly tinged with brown. Dorsal surface of abdomen buckthorn brown, suffused laterad with prout's brown. Cerci prout's brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Rio Trinidad, *type*	16	3.6	4.8	16.2	4.4
Rio Trinidad, *paratype* . .	13.5	3.3	4.7	15	4.2
♀					
Rio Trinidad, *allotype* . . .	15.5	4	5.5	16.7	4.6
Rio Trinidad, *paratype* . .	14.5	3.9	4.9	15.7	4.4
Rio Trinidad, *paratype* . .	14.6	4	4.9	16.8	4.7

In addition to the type and allotype, one male and two female paratypes are at hand, bearing the same data but taken March 28 to May 9, 1911 and 1912.

Ischnoptera inca Saussure and Zehntner (Plate IV, figure 12.)

1893. *Ischnoptera inca* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 38, pl. iv, fig. 23. [Senahu, Vera Paz, Guatemala.]

It is to be noted that material from Peru is included with the original description, described as a variety. We here select Senahu, Guatemala, as the type locality for *inca*. Consequently, should Peruvian material prove to be a distinct species, as is very probable, it will require a different name.

Rio Trinidad, Panama, VI, 4, 1912, (Busck), 1 ♀.
Cabima, Pan., V, 29 and 30, 1911, (Busck), 2 ♂.

It is much to be regretted that the male genitalia were virtually undescribed, a brief and unsatisfactory description of the supra-anal plate alone having been given.

The size is either somewhat variable in this insect, or more than one species of this type, with solidly black pronotum and antennae yellowish beyond the proximal portion, is represented in material before us. The material here recorded shows in tegminal length: ♂, 8.7 to 8.9; ♀, 8.3 millimeters. A female from Costa Rica shows for this dimension, 10.8; one from Nicaragua, 9.3 millimeters.

Ischnoptera mirella new species (Plate IV, figure 13.)

In the solidly dark pronotum and antennae this diminutive insect agrees with *I. crispula* Rehn and *I. castanea* Saussure (the male type of the former from Pará, Brazil, and a male of the latter species from Igarapé-assú, Pará, Brazil, are before us), while in size and general coloration further agreement with the latter species is found.

The male genitalia of the present species are, however, of a remarkable type showing no affinity to any of the previously described species of the genus.

Type.—♂; Porto Bello, Panama. April 17, 1912. (A. Busck.) [United States National Museum.]

Size small, form moderately slender as in *castanea*. Interocular space broad, intermediate between the width between the ocelli and that between the antennal sockets. Ocelli large and distinct, flattened surface of ocellar areas forming a moderately sharp angle with the interocellar area. Maxillary palpi short; fifth (distal) joint slightly longer than third, which joint is slightly longer than the fourth.

Pronotal disk with latero-caudal sulci very pronounced, as in *I. inca* Saussure and Zehntner. Tegmina and wings extending beyond apex of abdomen nearly twice the cercal length. Wings with well developed intercalated triangle. Dorsal surface of abdomen specialized, as is characteristic of males of the genus, with the exception that the raised portion of the seventh abdominal segment is unusually large, horse-shoe shaped, with dorsal surface deplanate and subchitinous.

Supra-anal plate very highly specialized; strongly produced, straight, directed caudad with a moderate inclination sinistrad, extending to distal portion of sinistral cercus, the produced portion about twice as long as broad, curled over longitudinally sinistrad so that the sinistral portion of the free margin is ventrad, the dorsal surface there longitudinally convex, bordered dextrad by a shallowly concave channel, beyond this deflexed so that the dextral portion of the free margin is ventrad in the produced portion of the plate; sinistral margin straight, curving upward distad to the brief transverse distal margin, supplied with a heavy fringe of agglutinated chaetiform spines which distad project beyond the distal margin; distal margin straight, subchitinous, moderately oblique, the greater production of the plate being sinistrad; dextral margin showing a strong subcircular emargination sinistrad of cercal base, thence nearly straight along produced portion of plate, showing a moderate oblique inclination sinistrad in proximal half, this weaker in distal half, the dextro-caudal angle rounded and supplied with moderately numerous hairs. From the shape of the produced portion of the supra-anal plate nearly a third of the dextral portion of the anal chamber is exposed from above. Cerci with (eleven) distinct joints, feebly convex dorsad, strongly so ventrad with cingulation of lateral margins very weak, subobsolete as is usual in the small species of the genus.

Concealed genitalia: without dissection we can only observe that the paired plate beneath the supra-anal plate is flattened into a chitinous wall cephalad, from which projects at the base of the dextral cercus a minute upcurved process with apex aciculate, beneath which is a short heavier projection armed along its dextral margin distad with four minute but heavy and regular teeth.

Subgenital plate subtriangular; sinistral margin feebly convex to apex, showing a small concavity slightly beyond the mesal point, from a socket there situated springs a very minute simple style feebly tapering to its unarmed rounded apex, slightly over twice as long as basal width, dextral margin slightly more strongly convex, apex surmounted by a highly specialized (the dextral) style, which latter from a slender base projects caudad to a rounded apex, its entire sinistral surface produced in a feebly tapering cylindrical arm which curves sinistro-proximad and fits within the distal portion of the production of the supra-anal plate, the distal portion of this arm supplied with minute scattered teeth (see plate IV, fig. 13). Armament of limbs as characteristic for the genus. Four proximal caudal tarsal joints supplied ventro-distad with moderately well developed pulvilli. Arolia very small.

Head shining, very dark chestnut brown, ocelli, mouthparts and proximal joints of maxillary palpi buffy, the two distal joints of the maxillary palpi heavily washed with chestnut brown. Antennae dark chestnut brown. Pronotum shining, uniform dark chestnut brown. Tegmina translucent, heavily suffused with chestnut brown except in portion of costal field toward costal margin which is paler, buffy.

Wings with costal field and all veins rather dark chestnut brown, all remaining portions of wing except proximal two-thirds of anterior field strongly tinged with chestnut brown. Dorsal surface of abdomen shining, rather dark chestnut brown. Cerci chestnut brown. Ventral surface of abdomen chestnut brown, slightly paler meso-proximad. Limbs buffy, except proximal portions of coxae which are suffused with chestnut brown, spines tawny.

Length of body, 10.2; length of pronotum, 2.8; width of pronotum, 3.3; length of tegmen, 11; width of tegmen, 2.9; length of cercus, 2; length of caudal femur, 4; length of caudal metatarsus, 2; length of succeeding caudal tarsal joints, 1.9 millimeters.

The type of this remarkable species is unique.

Ischnoptera panamae new species (Plate IV, figures 14 and 15.)

This species in general appearance resembles *I. tolteca* Saussure.[105] The description of *I. nana* Saussure and Zehntner would indicate nearest relationship to that species, but so insufficient is it that nothing definite as to the real degree of affinity can be ascertained. From that description, it appears that the present insect differs from *nana* in having the latero-caudal sulci of the pronotal disk distinct, not obsolete, while the styles of the male subgenital plate can hardly be termed normal.[106] In every case where males have been available for comparison, the genitalia for each species of the second section of the genus *Ischnoptera* have been found not only highly specialized but very distinctive.

Type.— ♂; Empire, Canal Zone, Panama. November 14, 1913. (M. Hebard.) [Hebard Collection, Type no. 488.]

Size small, form moderately slender, much as in *I. mirella* here described. Interocular space moderately broad, slightly narrower than that between the ocelli, hardly three-fifths that between the antennal sockets. Ocelli large and distinct, flattened surface of ocellar areas forming a blunter angle with the interocellar area than in *mirella*. Maxillary palpi short, fifth (distal) and third joints subequal in length, distinctly longer than fourth. Latero-caudal sulci of pronotal disk moderately decided.[107] Tegmina and wings extending a short distance beyond apices of

[105] The unstudied collections at hand contain a number of species which, though in general appearance closely resembling *tolteca*, show remarkable male genitalic features of specific diagnostic value.

[106] From the measurements given for *nana*, the present species differs in the shorter pronotum and the more elongate tegmina. We regret that we do not, however, feel the confidence in the accuracy of the measurements given in this portion of the Biologia Centrali-Americana, probably taken by Zehntner, necessary to make them of any great value for close comparisons.

[107] In some individuals of the series more strongly indicated than in others.

the cerci. Wings with a moderately well developed intercalated triangle. Dorsal surface of abdomen specialized as is characteristic of the genus; eighth segment with caudal margin rather strongly concave.

Supra-anal plate symmetrical, slightly over half as long as basal width; trapeziform produced between the cerci, with latero-caudal angles rounded and distal portion curled briefly ventrad, this decurved surface hairy, the transverse distal margin very feebly obtuse-angulate emarginate with apex of emargination rounded, this margin with ventral surface supplied with a narrow fringe of chaetiform spines directed cephalad. Cerci with joints (ten to twelve in the series) as in *mirella*.

Concealed genitalia: paired plate beneath supra-anal plate developed into two large disks, forming the basal wall of the anal chamber, the dextral overlapping the sinistral, the distal margins of these plates supplied with short heavy teeth (plate IV, fig. 15): titillator with apex simple and aciculate.

Subgenital plate with surface weakly convex, supplied with scattered hairs; sinistrad produced for a brief distance and curled under the cercus, the free margin of this portion fringed with chaetiform spines; dextrad produced about twice the length of the sinistral production and similarly curled under the cercus, the distal extremity of the dextral free margin bearing within a conical process much heavier than, and as long as, the largest style, its blunt apex supplied with a tuft of elongate agglutinated chaetiform spines, this directed sinistrad and entirely within the anal chamber; beyond these lateral portions the distal margin is transverse and weakly concave on each side, the remaining median third briefly produced, trapezoidal, the dextral production slightly the greater; sinistral style at sinistro-distal angle of this production, small, rather slender, cylindrical, over four times as long as proximal width, with apex bearing a few minute teeth; dextral style at dextro-distal angle of this production, similar to sinistral style but about three-quarters as large, extending a very slight distance further caudad, due to the general greater production of the plate in the dextral portion.

Armament of limbs as characteristic for the genus. Four proximal caudal tarsal joints supplied ventro-distad with small pulvilli. Arolia small.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

This sex differs from the male in the following features. Size distinctly larger,[108] form more robust. Interocular space broader, but, due to the broader head, showing the same proportionate width to that between the ocelli and that between the antennal sockets. Ocelli not as large and angle with interocellar area not as sharp. Tegmina and wings proportionately fully as elongate as in male. Supra-anal plate triangularly produced with lateral margins feebly convex and apex showing indication of emargination.[109] Subgenital plate moderately convex except toward

[108] The decided variation in size and coloration of the four females at hand would cause uncertainty, as to whether more than one species is represented, were it not for the fact that they agree closely in general structure, differing only in features which can not be considered of specific diagnostic value, while the fourteen males before us are readily recognizable as belonging to but one species.

[109] In the series varying from a type in which the apex is rounded, to one in which it is distinctly emarginate, forming two well-rounded projections.

cercal bases where feeble concavity is indicated, very broad, with free margin evenly and broadly convex.

Head blackish chestnut brown, ocelli, mouthparts and maxillary palpi buffy. Antennae mummy brown. Pronotum shining, chestnut brown, narrowly margined laterad, except more broadly in area just caudad of discal sulci, and very narrowly margined cephalad with warm buff, the disk with a medio-longitudinal streak of tawny, which is broadest before the caudal margin. Tegmina translucent, light chestnut brown, with costal field dark in internal half, chestnut brown and in half toward costal margin warm buff. Wings very weakly suffused with brown, area of costal veins darker. Dorsal surface of abdomen buffy suffused with prout's brown, darkened distad. Cerci chestnut brown. Proximal portion of coxae blackish chestnut brown, the remaining portions of the limbs buffy with spines tawny. Ventral surface of abdomen blackish brown, except mesad and narrowly along the caudal margins of the segments, where it is buffy.

The series of males approximate this, the type, in coloration. In the maximum recessive condition the dark portions of the pronotal disk are much reduced, russet, the pale median line more extensive and continued out each of the latero-caudal sulci to the pale lateral margin, thus dividing the dark suffusion of the pronotal disk into four parts.

The females are all more intensive in coloration than the males. The allotype has the entire pronotum blackish chestnut brown, except the narrow pale margin and a narrow suffused medio-longitudinal line of hazel. Those from Old Panama and Panama City show only a feeble trace of the medio-longitudinal line of paler coloration, while the specimen from Chorrera has the pronotal disk solidly blackish chestnut brown. In the two darkest examples the distal portion of the fourth and all of the fifth joints of the maxillary palpi are heavily suffused with blackish chestnut brown.

A large immature female is entirely blackish brown, except for a paler longitutinal suffusion mesad on the mesonotum and metanotum of russet, and the cephalolateral margins of the pronotum and lateral margins of the mesonotum and metanotum which are ochraceous-buff.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *paratype*	8	2.2	2.9	9	2.8
Rio Trinidad, *paratypes* (7)	8.2–9.8	2.3–2.6	3–3.2	9.7–10	2.9–3
Empire, *type*	9.4	2.7	3.2	9.8	3
Old Panama, *paratypes* (2)	8.4–9.8	2.2–2.3	3–3.2	9–9.8	2.9–3
♀					
Empire, *allotype*	10.7	2.9	3.7	10	3.1
Old Panama, *paratype*	11.9	2.9	3.8	11	3.6
Panama City, *paratype*	9	2.7	3.3	9.2	2.9
Chorrera, *paratype*	12	2.9	3.9	12	3.7

In addition to the type and allotype the following series of paratypes is before us.

Gatun, Canal Zone, Panama, VII, 12 to 15, 1916, (Harrower), 1 ♂.
Rio Trinidad, Pan., III, 7 to VI, 4, 1911 and 1912, (Busck), 7 ♂.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♂, 1 juv. ♀ in instar preceding maturity.
Paraiso, C. Z., Pan., IV, 24, 1911, (Busck), 2 ♂.
Old Panama, Pan., XI, 13, 1913, (Hebard; under drift on edge of coral sand beach), 2 ♂, 1 ♀.
Panama City, Pan., XI, 1913, (Zetek), 1 ♀, [United States National Museum].
Chorrera, Pan., V, 17, 1912, (Busck), 1 ♀.

Xestoblatta festae (Griffini)

1896. *E[pilampra] festae* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 2. [[♀], Punta de Sabana, Darien.]
1916. *Xestoblatta festae* Hebard, Trans. Am. Ent. Soc., xlii, p. 377, pl. xix, figs. 8 to 11. [Detailed discussion of both sexes.]

Porto Bello, Panama, IV, 20, 1912, (Busck), 1 ♀.
Gatun, Canal Zone, Pan., VII, 19 to 22, 1916, (Harrower), 1 ♀.

Xestoblatta immaculata new species (Plate IV, figure 16.)

This, one of the finest species of the Group Ischnopterites, is readily distinguished from any of the described forms of the present genus by its larger size, immaculate and paler coloration and form of interocular space. The male genitalia will probably be found to be very distinctive.

In linear arrangement we would place this species after the highly colored *X. nyctiboroides* (Rehn) and before *X. carrikeri* Hebard. It appears to represent a distinctive type, as does *nyctiboroides*. The decided width of the interocular space and proportions of the joints of the maxillary palpi show nearer agreement with *carrikeri*.

Type.— ♀ ; Alhajuela, Panama. March 10, 1912. (A. Busck.) [United States National Museum.]

Size very large and form broad for the Group. Head with interocular space very broad; narrower ventrad (dorsad 1.8, ventrad 1.1 millimeters), due to the internal margins of the eyes being moderately convergent, not subparallel as in the other known species of the genus; least interocular width equal to that between the ocelli, little less than that between the antennal sockets, these proportions much as in the female sex of *carrikeri*. Ocellar spots distinct, not well developed as in *Ischnoptera*, ocellar area weakly defined. Pronotum as characteristic of the genus, evenly and

distinctly convex; lateral margins very feebly cingulate; greatest width meso-caudad; caudal margin transverse, but showing a broad and weak convexity mesad. Tegmina and wings broad and reaching slightly beyond the cercal apices; venation as characteristic of the genus, veins numerous (ulnar vein of wing with five complete and seven incomplete branches). Sixth dorsal abdominal segment with latero-caudal angles sharply rectangulate, not produced caudad; seventh segment with a heavy rounded chitinous projection laterad on each side; eighth segment simple.

Supra-anal plate rotundato-trigonal produced between the cerci, length distinctly less than half the basal width, less strongly chitinous toward apex with free margin supplied with hairs. Subgenital plate very ample, strongly convex; free margin convex, flattened toward cerci, narrowly curled dorsad in median portion, this brief area showing a medio-longitudinal cleft or sulcation. Limbs and armament of same as characteristic of the genus. Four proximal caudal tarsal joints supplied disto-ventrad with moderately large rounded pulvilli. Arolia small.

Head immaculate ochraceous-tawny, eyes blackish mummy brown. Ocelli and proximal antennal joint pale ochraceous-tawny, antennae cinnamon brown. Maxillary palpi pale ochraceous-tawny, the distal joint ochraceous-tawny. Pronotum immaculate zinc orange tinged with tawny, deepening slightly to tawny along caudal margin. Tegmina translucent, tawny, except costal field which is ochraceous-buff with feebly cingulate margin tawny. Wings transparent, with a faint tawny tinge, except in area of costal veins where they are tinged with buffy, becoming weak tawny in entire distal portion of anterior field. Mesonotum, metanotum and dorsal surface of abdomen ochraceous-buff, shading to dull ochraceous-orange in distal portion of abdomen. Cerci cinnamon brown. Ventral surface of abdomen tawny, deepening to russet on subgenital plate. Limbs ochraceous-tawny, deepening to tawny on tibiae and tarsi.

Length of body, 22.5; length of pronotum, 5.9; width of pronotum, 7.8; length of tegmen, 21; width of tegmen, 6.8; length of wing, 18.8; depth of wing, 12; length of caudal tibia, 8.2; length of cercus, 3.9 millimeters.

In addition to the type, two immature examples, taken at Porto Bello, Panama, February 28, 1911 and April 20, 1912, by Busck, are before us. These have the head, pronotum and cerci sanford's brown, the remaining portions blackish chestnut, the tarsi distinctively marked with buffy in a very broad annulus on the metatarsus and the proximal portion of the ultimate tarsal joint. Their length is 10.2 and 12.4 millimeters respectively.

EUPHYLLODROMIA Shelford

1908. *Euphyllodromia* Shelford, Gen. Ins., 73me fasc., Orthoptera, Blattidae, Phyllodromiinae, p. 17.

This name was proposed as of subgeneric value for the American species previously assigned to *Pseudophyllodromia* Brunner.[110] We consider that it represents a unit of full generic value.

In the subgenus were included twelve species. GENOTYPE; here selected.—[*Blatta*] *Euphyllodromia angustata* (Latreille).

The following features are considered of generic diagnostic importance. Size small, structure extremely delicate. Head very broad, not covered by pronotum. Eyes well separated and prominent, projecting laterad. Pronotum transverse, lateral margins weakly deflexed, oblique sulci of disk weak. Tegmina fully developed in both sexes; discoidal vein angulate near apex of anal field; discoidal sectors few (three), with intermediate veins, which become obsolete proximad, longitudinal. Wings narrow; costal veins thickened in distal half, ulnar vein with few branches (one to four, the latter number due to further distal ramification of the branches), intercalated triangle very narrow. Dorsal surface of male abdomen with sixth segment specialized mesad, the segments showing further specialization of the latero-caudal angles. Female subgenital plate strongly cleft meso-distad. Ventro-cephalic margins of cephalic femora armed with a few heavy spines, succeeded by a more closely placed row of minute chaetiform spines, terminating in three heavy spines, elongate in increasing ratio distad. Fourth tarsal joint alone supplied with a large pulvillus which occupies its entire ventral surface.[111] Tarsal claws unspecialized. Arolia small.

[110] The genotype of that genus is *Pseudophyllodromia ornata* Brunner, from the Philippines, selected by Rehn, Trans. Am. Ent. Soc., xxix, p. 261, (1903).

[111] In addition to the very different tegminal and wing venation, we note from material of *Pseudophyllodromia laticeps* (Walker) that the three proximal tarsal joints are all supplied ventrad with small pulvilli, the fourth with a pulvillus as described above. We regret that we have no material of the genotype of *Pseudophyllodromia* before us.

Specimens of *Pseudophyllodromia pulcherrima*, described as an aberrant species by Shelford, received from that author, show that the species represents a genus distinct from that of *laticeps*.

Euphyllodromia angustata (Latreille) (Plate IV, figure 17.)

1811. *Blatta angustata* Latreille, in Humboldt and Bonpland, Recueil. Observat. Zool. et Anat. comp., i, p. 146, pl. xv, fig. 9. [Vera Cruz, [Vera Cruz, Mexico.]]

Gatun, Canal Zone, Panama, (Jennings; 2 from bush), 3 ♂, 1 ♀; VI, 1915, VII, 12 to VIII, 22, 1916, (Harrower), 8 ♂, 15 ♀, 6 juv.

Lion Hill, C. Z., Pan., VI, 18, 1907, (Busck), 1 ♀.

Alhajuela, Pan., IV, 5 and 18, 1911, (Busck), 1 ♂, 2 ♀.

Rio Trinidad, Pan., III, 14 to V, 2, 1911 and 1912, (Busck), 3 ♂, 1 juv.

Tabernilla, C. Z., Pan., IV, 27, 1907, (Busck), 1 ♂.

Paraiso, C. Z., Pan., I, 16 to II, 10, 1911, (Busck, Schwarz), 3 ♂, 1 ♀.

Cabima, Pan., V, 24 to 28, 1911, (Busck), 1 ♂, 2 juv.

Arajan, Pan., IV, 28, 1911, (Busck), 1 ♀.

Argas, Pan., IV, 28, 1911, (Busck), 1 ♂, 1 ♀.

The immature examples of this insect are as handsome as the adults, but very different in color and color pattern (see plate IV, fig. 17). These are solidly black dorsad with a very narrow medio-longitudinal buffy line and the lateral margins more broadly of the same coloration. The antennae are black, with a broad medio-proximal and broader medio-distal annulus of white. The cerci are black, fading proximad and distad to buffy.

When we consider that the very complex color pattern of the adult appears only after the last moult, it is surprising to find it as extremely constant as is shown by this and other considerable series of the species at hand.

In the adult condition the maxillary palpi are always whitish, never showing darker markings or suffusions.

Euphyllodromia decastigmata[112] new species (Plate IV, figures 18 to 20.)

The present species shows nearest relationship to *E. angustata* (Latreille), differing in its slightly smaller size, absence of a medio-longitudinal pale line on the pronotum, distinctly shorter tegmina, differently marked mesonotum and metanotum and distinctive styles of the male subgenital plate, which are much more elongate and produced than in any other species of the genus known to us.

Type.— ♂; Gatun, Canal Zone, Panama. July 28 to August 6, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 489.]

Size small for the genus, form and very delicate structure normal. Head with interocular space (.35 millimeter) about one-third width between antennal sockets. Ocellar spots small and weakly defined. Maxillary palpi with fourth joint approxi-

[112] In allusion to the ten pale markings found on the pronotum.

mately as long as third, widening evenly and gently distad, so that it becomes twice as broad as the third joint; fifth joint three-quarters as long as fourth, moderately expanded, greatest width near base, ventral margin from that point nearly straight, oblique to apex. Pronotum strongly transverse; cephalic margin truncate; lateral margins rather strongly convex, this greatest caudad; caudal margin transverse but slightly and broadly rotundato-angulate produced mesad; discal sulci very weak. Tegmina and wings less ample than in *angustata*, length approximating body length, not as in that species decidedly greater than body length.

Dorsal surface of abdomen with second and third segments showing a weak longitudinal ridge along the lateral margins; fourth, fifth and sixth segments with similar ridges more pronounced and oblique, extending to the caudal margin a distance from the latero-caudal angle. Sixth dorsal segment weakly depressed mesad and bearing there an inconspicuous tuft of agglutinated hairs, less heavily chitinous in median section with caudal margin there very feebly and broadly concave. Seventh dorsal segment narrowly projecting, on each side forming a raised oval, transverse to the body length, its cephalic and internal margin formed by a moderately decided ridge, this segment showing no medio-longitudinal ridge, caudal margin broadly concave between these areas. Eighth dorsal segment very narrowly projecting, its caudal margin convex.

Supra-anal plate strongly transverse, showing a broad and weak triangular production between cercal bases with rounded apex obtuse-angulate. Cerci small, elongate-and slender, tapering to acute apex; dorsal surface flattened, ventral surface of each joint convex with lateral margins strongly cingulate, the latero-external margins the more so. Paired plate beneath supra-anal plate large and unspecialized.

Concealed genitalia complex.[113] Subgenital plate symmetrical, surface with a flexure dorsad toward the free margin; sinistral margin straight, oblique to median portion, dextral margin oblique to median portion with a moderate obtuse-angulate convexity; median portion with two deeply inset and smoothly rounded styliform plates which taper and are attingent distad (suggesting the type found in *Chorisoneura*), four-fifths as long as distance from their base to margin of preceding segment, between these styles is a very thin plate, slightly over half as long, with ventral margin armed with minute sharp recurved teeth.

Armament of limbs, pulvilli, tarsal claws and arolia as given here in generic diagnosis. Succeeding tarsal joints only three-fourths as long as caudal metatarsus.

Allotype.— ♀ ; Porto Bello, Panama. February 15, 1911. (E. A. Schwarz.) [United States National Museum.]

Agrees closely with type in coloration, color pattern and length of organs of flight. Body somewhat larger. Interocular space scarcely wider. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, very broadly bilobate,

[113] In almost all the material of the genus at hand, the concealed male genitalia have been crushed, owing to the extremely delicate structure of the abdomen. It will consequently be a most difficult matter to consider these organs, except in specimens which are fresh or have been kept in liquid preservative.

length about one-fifth proximal width. Subgenital plate with lateral margins feebly convex and weakly convergent to beneath cerci, thence straight to distal portion, which is strongly V-emarginate, with sides of emargination convex, the interval occupied by a mantle which is not chitinous, the apices of the plate thus formed rather bluntly rounded, weakly acute-angulate, supplied with setae.

Head with vertex cinnamon rufous, paling to ochraceous-buff toward labrum; eyes tawny; ocellar spots buffy. Antennae mummy brown, except proximal joint and ventral surface of succeeding joint which are buffy. Maxillary palpi with proximal and third joints white suffused with mummy brown, fourth and fifth joints white. Pronotum shining, lateral margins transparent, buffy; disk blackish chestnut brown except for the following markings, cephalic margin very narrowly warm buff with a brief linear median invasion of this color running into the disk, just before the lateral margins of the disk are three small linear flecks on each side of which the cephalic pair are the largest, linear and divergent caudad; in addition there is a pair of similar linear flecks mesad, which are parallel, and a single fleck mesad near the caudal margin. Mesonotum with a medio-longitudinal fleck of warm buff, dark chestnut brown on each side, paler laterad. Metanotum dark chestnut brown with a pair of warm buff flecks caudad.

Tegmina transparent, buffy, except in portion from apex of anal field to distal portion of costal margin, which portion is translucent, heavily washed with ochraceous-tawny proximad, becoming weaker with less of an orange tinge distad; in the proximal portions of the tegmina all of the veins, the anal sulcus and the area between the anal sulcus and the last of the veins of the anal field are chestnut brown (the ulnar vein is obsolete before the apex of the anal field, this area resultantly the largest of the transparent areas).

Wings transparent, feebly suffused distad, veins chestnut brown, the half of the costal veins toward the costal margin solidly chestnut brown. Dorsal surface of abdomen ochraceous-tawny, except median segment which is dark chestnut brown. Cerci with dorsal surface whitish, suffused along the internal margins with dark chestnut brown. Coxae and ventral abdominal segments laterad with suffusions of mummy brown, these forming a broad interrupted band on each side of the abdomen, the remaining portions of which are buffy. Limbs buffy; dorsal surfaces of femora and tibiae washed with mummy brown, ventral margins of femora (frequently in the series) tinged with mummy brown, this heaviest on the caudal femora; all spines faintly tinged with tawny, a minute delicate fleck of mummy brown at the base of each.

The female sex of this species is very similar in coloration. The dorsal surface of the abdomen is frequently suffused with chestnut brown laterad and caudad, the third segment with latero-caudal angles briefly buffy.

It is to be noted that numerous features of color pattern and coloration are of great specific diagnostic importance in the species of the present genus.

The immature condition is widely different in coloration from the adults and from the immature condition of *angustata*. In these the lateral margins of the fifth

dorsal abdominal segment are buffy, the remaining portions of the pronotum, mesonotum and metanotum brown, with a strong orange tinge, the mesonotum broadly blackish chestnut brown before the lateral margins. The abdomen dorsad is blackish chestnut brown, except for the following buffy markings; a medio-longitudinal narrow band to and including the fourth segment; fifth segment with a median transverse narrow band; sixth segment with a dot on each side; seventh segment with all of proximal portion; eighth and ninth segments concealed. Supra-anal plate buffy with a marginal suffusion of brown. Cerci buffy with a suffusion of brown on their internal surfaces. Antennae each with two conspicuous white annuli as in *angustata*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *type*	8.5	2.1	3.5	8.7	2.7
Tabernilla, *paratype*	8.7	2.2	3.5	9	2.7
♀					
Porto Bello, *allotype*	9	2.3	3.6	8.7	2.8
Porto Bello, *paratype*	9.1	2.4	3.7	8.9	2.8
Alhajuela, *paratypes* (4)	8.1–9.5	2.2–2.5	3.7–3.8	8.9–9.2	2.8–3

In addition to the type and allotype, the adults of the following series may be considered paratypes.

Porto Bello, Panama, III, 1 and 13, 1911, (Busck) 2 ♀; VIII, 18 at 21, 1916, (Harrower), 1 juv.

Gatun, Canal Zone, Pan., VII, 28 to VIII, 5, 1916, (Harrower), 5 juv.

Alhajuela, Pan., IV, 17, 1911, (Busck), 5 ♀.

Tabernilla, C. Z., Pan., IV, 27 to VI, 4, 1907, (Busck), 2 ♂, 1 ♀.

Pseudomops gloriosa new species (Plate V, figures 1 to 3.)

This insect belongs to the section of the genus having non-spatulate cerci and to the large and distinctively colored forms of the same, of which nearest relationship is with *P. grata* Rehn.

From that species the present differs in the black head, tegmina with an elongate triangular pale orange area with base of triangle on the costal margin, black limbs with coxae narrowly margined proximad with orange and black abdomen except for a small meso-proximal suffusion of orange.

To this group undoubtedly belongs *P. bicolor* Shelford and probably also *P. magna* and *P. albostriata*, described by that author.

Type.— ♀; Cabima, Panama. May 28, 1911. (A. Busck.) [United States National Museum.]

Size large for the genus; form elongate, graceful, as in *grata*. Head with eyes widely separated, interocular width least dorsad, nearly twice that between antennal sockets, ocellar spots very small. Maxillary palpi with third joint slightly longer than fourth, fifth joint enlarged and about one and one-fifth times as long as third joint. Antennae longer than body, heavily plumose in proximal two-fifths, this heaviest in distal section of this portion. Pronotum rather elongate, decidedly broader caudad than cephalad; cephalic margin truncate, caudal margin broadly obtuse-angulate convex. Tegmina and wings elongate and slender. Tegmina with numerous regular costal veins and (six) longitudinal discoidal sectors. Wings with costal veins weakly thickened throughout almost their entire length; ulnar vein with(two) complete branches which spring from the proximal half of the vein.

Supra-anal plate triangularly produced, about half as long as basal width, sides of produced portion feebly concave to broadly rounded apex. Cerci slender, flattened dorsad, segments (thirteen) strongly convex ventrad with lateral margins cingulate. Subgenital plate broad, transverse, evenly convex, free margin broadly and evenly convex. Limbs elongate and slender. Ventro-cephalic margin of cephalic femora armed with a few elongate heavy spines, succeeded by a row of closely placed short but moderately stout spines, terminating in three heavy spines elongate in increasing ratio distad. Four proximal tarsal joints each supplied ventro-distad with a very small pulvillus. Tarsal claws simple, delicate. Moderately well developed arolia present.

Head, ventral surface and limbs shining black, except ocellar spots, brief suffusions at bases of coxae and suffusion meso-proximad on abdomen which are pale orange. Antennae black, except for a white annulus which includes the first seven joints beyond the plumose portion. Pronotum shining orange-rufous except for the produced caudal portion which is black, the cephalic margin of this area sharply defined, transverse but somewhat undulating. Tegmina weakly translucent, black except for a roughly triangular solid area of pale orange which occupies nearly half the tegminal surface, its base the proximal three-quarters of the costal margin, its apex broadly truncate, situated just beyond the angulation of the ulnar vein; the concealed portion of the dextral tegmen when at rest broadly suffused with pale orange medio-longitudinally, there transparent. Wings black at base and apex of anterior field, area of costal veins pale orange, other portions transparent, pale orange, the base and free margin of the radial field broadly tinged with black. Remaining dorsal surface of insect shining black. Cerci black proximad with distal three-fifths whitish.

Length of body, 13; length of pronotum, 4.9; width of pronotum, 4.9; length of tegmen, 14.5; width of tegmen, 3; length of wing, 13; width of wing, 5.6; length of cercus, 3.3; length of caudal tibia, 6.1 millimeters.

The type of this beautiful species is unique.

Subfamily NYCTIBORINAE

We would note that in all the species of the genera *Nyctibora*, *Eunyctibora* and *Paratropes* at hand, the tarsal claws are distinctive in being asymmetrical, the cephalic claw being decidedly shorter than the caudal claw, and not or very slightly projecting beyond the arolium. In *Megaloblatta*, however, the tarsal claws are symmetrical, the arolia subobsolete, represented by a small chitinous node between the bases of the tarsal claws.

Nyctibora noctivaga Rehn (Plate V, figure 4.)

1896. *N[yctobora] mexicana* Griffini (not of Saussure, 1864), Boll. Mus. Zool. Anat. comp. Univ. Torino, ix, no. 236, p. 2. [One specimen; Lake Pita, Darien.]

1903. *Nyctibora noctivaga* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♂; Machuca, San Juan River, Nicaragua.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 5, 1916, (Harrower; from banana stalks), 3 juv.

Paraiso, C. Z., Pan., (Schwarz), 1 ♂; I, 8 and II, 7, 1911, (Busck), 2 juv.

Cabima, Pan., V, 30, 1911, (Busck), 1 ♀.

The distinctive male supra-anal plate of this insect, the largest of the uniformly dark species of the genus, is here figured.

The extremes in pronotal and tegminal proportions are rather decided, in a series of three males and four females now before us, including the type, being as follows: pronotum, ♂, 8.8 to 9.8 by 12.8 to 14, ♀, 9 to 10.8 by 14 to 15.3; tegmina, ♂, 37.8 to 41.8 by 14.6 to 16.2, ♀, 35.9 to 42 by 14.5 to 17.2 millimeters. The maximum is shown by a pair from Jamaica, the pair from Panama approach the minimum.

Eunyctibora nigrocincta (Shelford)

1907. *Nyctibora nigrocincta* Shelford, Ann. Mag. Nat. Hist., (7), xix, p. 37. [♂, ♀; Colombia.]

1908. *E[unyctibora] nigrocincta* Shelford, Gen. Ins., 74me fasc., Orth., Blattidae, Nyctiborinae, p. 2, pl., fig. 1. (Colored dorsal view.)

Ancon, Canal Zone, Panama, VI, 1913, (Zetek), 1 ♀, [Hebard Collection].

Bocas del Toro, Pan., VII, 1 to 10, 1908, (Wirt Robinson), 1 ♂, [United States National Museum].

Paratropes bilunata Saussure and Zehntner

1893. *Paratropa bilunata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 60. [♀; Bugaba, Panama.]

Bugaba, Panama, (W. Schaus), 1 ♂, [Hebard Collection].

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
San Carlos, Costa Rica ..	21.3	5	8.7	22.8	8.1
Bŭgaba, Panama, *topotype*	20.1	5	8.8	22.8	8.7
♀					
San Carlos, Costa Rica..	18.5	5	8.6	20.3	8.8
Turrialba, Costa Rica...	17.5	5	8.8	20.8	8.8

The pronotal coloration, dark and immaculate except for two large pyriform yellowish-buff markings at the cephalic margin on each side, readily distinguishes this handsome species. The tegmina have a large patch of similar coloration proximad on the marginal field.

Paratropes pinoganae new species (Plate V, figure 5.)

This insect is very closely related to *P. phalerata* (Erichson), but differs in the following features. Pronotum with dark marking having the meso-cephalic invasion of the pale cephalic marginal band with apex broad and truncate, showing no small median triangular production; tegmina and wings shorter;[114] tegmina with dark margin of proximal two-thirds of costal margin wider and dark band at humeral trunk twice as wide as oblique band of sinistral tegmen, not of nearly equal width; dark marginal band of radiate field of wings much narrower; cerci pale, not black.

It is probable that series will show variation in some of the above features, but that the present insect will prove a valid species with even more distinctive features in the male sex, when this is known, is our belief.

Type.— ♀; Pinogana, Darien, Panama. December, 1915. (Muñoz.) [Hebard Collection, Type no. 491.]

Size medium, form broad as in the majority of the species of the genus.[115] Head with interocular space (.4 millimeter) about two-fifths that between the minute but

[114] Much as in females of *P. bilunata* Saussure and Zehntner; a female of *phalerata* from Trinidad has instead the tegmina and wings as elongate as in males of *bilunata*.

[115] We have given the following full structural description of the species, realizing that the majority of the features remarked are rather of generic than of specific diagnostic value. In this genus, color characters have been used almost exclusively for specific diagnoses, particularly in the female sex, and in certain features are undoubtedly among the most important for specific differentiation.

very distinct ocellar spots; face much flattened, polished, well supplied with short white hairs which spring from microscopic pits;[116] eyes not extending below antennal sockets; lateral margins of cheeks feebly convex convergent to clypeal suture. Antennae heavy and plumose in proximal two-thirds, this increasing distad, distal third slender and non-plumose. Maxillary palpi short; fourth joint about three-fifths as long as third, bent ventrad in narrow proximal neck, thence expanding decidedly to apex; fifth joint heavy and enlarged, springing from ventral three-fourths of apex of fourth joint. Pronotum with cephalic margin broadly convex, caudal margin more strongly convex, lateral angles rounded at distinctly less than a right angle; surface showing broad concavities latero-cephalad. Tegmina and wings fully developed, extending well beyond the abdominal apex, but not as elongate as in this sex of *phalerata*.

Supra-anal plate broadly produced between cercal bases, length about three-quarters proximal width, margin convex. Cerci short, extending but slightly beyond supra-anal plate with apex broadly rounded; dorsal surface deplanate with sutures of (seven) segments weakly defined, lateral margins straight; ventral surface with segments weakly convex and lateral margins very narrowly and weakly cingulate.

Subgenital plate broad, truncate; surface weakly convex, except laterad where it is rather decidedly concave; lateral portions deep before cercal bases, with latero-caudal margins more broadly rounded than those of preceding segment, thence the free margin is broadly concave to beyond the cercal bases, rounding broadly into the broad and very feebly convex distal portion.

Cephalic femora with ventro-cephalic margin supplied with a fringe of moderately short hairs, armed distad with two heavy elongate spines, of which the more distal is the longer; ventro-caudal margin unarmed except for a smaller distal spine. Ventro-cephalic margin of median and caudal femora armed with a single small but stout spine and a larger distal spine. Ventro-caudal margin of median and caudal femora armed in median portion with two slightly longer spines, with no distal spine. Tarsi short and stout, proximal four joints unarmed, supplied with large pulvilli, which occupy the entire ventral surface of each joint except the proximal third of the caudal metatarsus, which is shaped into a rather strong longitudinal ridge. Tarsal claws simple, asymmetrical, the cephalic claw much shorter than the caudal claw, not extending beyond the apex of the large arolium.

Head, antennae and underparts shining black, except ocellar spots and sutures of mouthparts which are buffy, and abdomen which is margined laterad and caudad by a broad band of ochraceous-buff (paler in the paratype, except on the subgenital plate where this marginal band is tinged with ochraceous-orange toward its internal margin). Pronotum black with a broad cephalic marginal band of ochraceous-buff having an orange tinge, this broader laterad, with its caudal margins there broadly convex, mesad with median invasion of black area broad, straight, transverse; two rounded rectangulate spots of the same pale color occur mesad at the caudal margin of the pronotum, separated by an interval of the same length.

[116] The ventral surface, femora and tibiae are similarly supplied with such hairs.

Tegmina translucent in pale portions, ochraceous-tawny tinged with orange (in the paratype this becoming gradually slightly weaker proximad in the costal field); all but distal third of costal margin black (in type, .65, paratype, .9; in female of *phalerata* at hand, .45 millimeter in width). Sinistral tegmen with sutural margin, including apex, more broadly margined with blackish brown, this even wider on dextral tegmen but not extending proximad of anal field. Sinistral tegmen with a broad humeral band (in type and paratype, 2.1 millimeters in width) and a narrower oblique band (in type, 1, in paratype, 1.2 millimeters in width), the latter springing from the proximo-internal angle of the anal field, these black in color and fusing just before the apex of the tegmen (in the examples of *phalerata* at hand these bands are subequal, 1.6 millimeters, in width). The humeral band is the same on the dextral tegmen to the portion concealed when at rest, where these markings are almost obliterated, the band which joins it distinct only along the decided oblique sulcus.

Wings transparent, ochraceous-tawny with an orange tinge; anterior field broadly margined distad with blackish brown (width mesad in type, 1.8, in paratype, 1.6 millimeters; in specimen of *phalerata*, 1.1 millimeters); radiate field very broadly bordered with blackish brown which narrows proximad, its internal margin concave, not nearly straight as in *phalerata* (at fold of wing, 5, proximad, 1; in female of *phalerata* at fold of wing, 8, proximad, 2.5 millimeters). Mesonotum and metanotum shining black. Dorsal surface of abdomen shining black, very broadly margined laterad with ochraceous-buff tinged with orange, some of the distal segments with free margin very narrowly of this color and all but a very narrow proximal portion of the supra-anal plate of this color. Cerci ochraceous-buff, suffused with brown dorso-distad.

Measurements (in millimeters)

♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmem	Length of caudal tibia
Paratropes pinoganae						
Pinogana, *type*	15.8	5.3	9.2	18.8	8	5.8
Corozal, *paratype*...	16	5.3	9.2	19.4	8.3	6
Paratropes phalerata						
Arima, Trinidad....	17.4.	5.8	9.7	21.8	8.5	6.1

In addition to the type, a female paratype from Corozal, Canal Zone, Panama, taken at light on May 12, 1913, by Zetek, is in the Hebard Collection.

Megaloblatta blaberoides (Walker)

1868. *Epilampra blaberoides* Walker, Cat. Dermapt. Saltat. Brit. Mus., v, Suppl. Blatt., p. 12. [♂, ♀; Chontales, Nicaragua.]

1887. *Megaloblatta rufipes* Dohrn, Stett. Ent. Zeit., xlviii, p. 409. [♂, Panama.]

Gatun, Canal Zone, Panama, VII, 25 to 31, 1916, (Harrower; under bark on tree), 1 ♂.

Cabima, Pan., V, 21, 1911, (Busck), 1 large juv. ♂.

Compared with the closely allied *M. longipennis* (Walker), of which a female from Ecuador is at hand, Costa Rican females of the present huge species are found to differ only in the much broader head, with interocular space much broader.[117]

The great expanse of this insect is realized when we consider that the tegmina of the present male measure 82 by 33.2 millimeters.

Subfamily EPILAMPRINAE

AUDREIA Shelford

1910. *Audreia* Shelford, Gen. Ins., 101me fasc., Orthoptera, Blattidae, Epilamprinae, p. 11.

The genus included eight species. *Genotype:* here selected.—*Audreia carinulata* [*Calolampra carinulata*] (Saussure).

First steps only have as yet been taken to separate properly the generic units related to *Epilampra*, in which partial to complete reduction in the organs of flight has occurred. At the present time, as was the case with Shelford in 1910, insufficient material is at hand to allow a proper revision to be made. A number of species are before us which must be assigned to this genus as characterized by Shelford, but which indicate the presence of at least four distinctive groups, though females alone of the majority of species are represented. Larger series and male examples will be needed before it can be determined whether these groups represent distinct genera, or are simply striking divisions in the genus *Audreia*, comparable to the many striking divisions in the genus *Epilampra* as at present defined.

Added difficulty is found in the fact that a similar situation is encountered in the allied genus *Calolampra* Saussure, the genotype of which is the Australian *C. irrorata* (Fabricius).[118]

Whether the tegmina and wings are reduced, truncate, lateral and lobiform, or absent, are features which in the Blattidae are known to be often utterly worthless from a generic standpoint.

[117] Interocular width: *M. blaberoides*, ♂, 1.7, ♀, 2.4; *M. longipennis*, ♀, 1.4 millimeters.

[118] The genotype of *Calolampra*, *Epilampra gracilis* Brunner, a synonym of *irrorata* according to Shelford, was selected by Rehn, Trans. Am. Ent. Soc., xxix, p. 274, (1903).

That *carinulata* and *irrorata* are generically distinct we feel certain, from study of a female of the former and paratypes of both sexes of the latter. Without the sexes of each species, we do not feel in a position to characterize *Audreia* more definitely than has been done in the meager description given by Shelford.

Audreia bromeliadarum Caudell

1914. *Audreia bromeliadarum* Caudell, Insec. Inscit. Menst., ii, p. 78. [♀; Upper Pequini (= Pequeni) River, Panama.]

Upper Rio Pequeni, Panama, III, 1909, (Jennings), 1 ♀, *type*.
Rio Trinidad, Pan., III, 29, 1912, (Busck), 1 juv.

In addition to the data given in the original description, we would note the following features for the type of this species. Entire dorsal surface heavily but minutely impresso-punctate. Dorsal abdominal segments with a row of small nodes near caudal margin of each (seventeen is the maximum number), these less strongly defined on mesonotum and metanotum and obsolete, except under a lens, on the pronotum. Cephalic femora with ventro-cephalic margin well supplied with a fringe of hairs, which are more numerous and closely placed distad, succeeded by two short distal spines, the more distal of which is twice as long and heavy as the more proximal; ventro-caudal margin armed with two widely placed short spines. Median and caudal femora with ventral margins armed with two to three and one distal similar spines; these with a single short heavy genicular spine dorsad. Tarsi unarmed ventrad, caudal metatarsus with pulvillus occupying all but proximal fifth of ventral surface, succeeding three joints with large pulvilli occupying their entire ventral surfaces. The pulvilli are moderately bilobate distad, that of the fourth with cephalic lobe (the internal lobe of the cephalic tarsi) produced and curved over the caudal lobe in a soft claw-like projection.

Audreia gatunae new species (Plate V, figure 6.)

This is a distinctive species, striking in its large size, broad form, convex and polished dorsal surface, with abdominal segments showing the characteristic minute linear ridges toward their caudal margins, subquadrate tegmina and broad, smooth and polished head, with occiput pale and face flattened, evenly and very feebly convex.

Compared with females of *A. carinulata* (Saussure), known only from Costa Rica, the female at hand is found to differ in its vastly greater size, slightly broader form, more strongly truncate tegmina, less convex face, greatly reduced arolia, paler vertex and even more weakly paler lateral margins of the pronotum and costal field of the tegmina.

Type.— ♀ ; Gatun, Canal Zone, Panama. July 28 to August 5, 1916. (D. W. Harrower.) [Hebard Collection, Type no. 492.]

Size very large, form broad for the genus. Head with vertex smooth, projecting beyond pronotum, rounding suddenly into the smooth and flattened, weakly convex, face; interocular space very broad (2.7 millimeters), only slightly narrower than that between antennal sockets; ocelli represented by small dots. Antennae slender and very short, length very close to pronotal width; length of third joint slightly over twice its width. Pronotum smooth, surface broadly convex except laterad where it is feebly concave; margin cephalad weakly convex, showing some truncation above head, lateral portions feebly cingulate; latero-caudal angles acute and sharply rounded, forming an angle distinctly less than ninety degrees; caudal margin broadly concave on each side, forming a very weak and broadly rounded median production. Tegmina coriaceous, polished, subquadrate, veins appreciable only, costal margins cingulate; production greatest at costal margin, angle there acute, sharply rounded; distal margin oblique to sutural margin, angle there obtuse, rounded, thus leaving a brief median portion of the metanotum exposed. Abdomen with median width greater than width of any other portion of insect; dorsal surface polished, distal half of each segment with small, very low, longitudinal ridges (maximum number twelve), the latero-caudal angles of each segment produced in a minute sharp tooth.

Supra-anal plate polished but microscopically irregularly striate, about half as long as proximal width, lateral margins broadly convex to a small obtuse-angulate median emargination, before which the surface of the plate is very briefly sulcate. Cerci very short and stout, tapering sharply in distal portion to acute apex; dorsal surface moderately convex and polished, showing the sutures of seven segments, the lateral margins of which are feebly convex; ventral surface strongly convex, clothed heavily with short stout hairs and a few very elongate slender hairs, lateral margins broadly deplanate, the external slightly more than the internal. Subgenital plate large, broad, evenly convex and polished; its free margin slightly within the lateral margins of the sixth dorsal abdominal segment and closely following the free margin of the supra-anal plate, broadly and feebly concave at the cercal bases, the convexity greatest between the cerci.

Cephalic femora with ventro-cephalic margin armed with four heavy and moderately elongate spines, succeeded by a series of moderately widely spaced small chaetiform spines, terminating in two heavy spines, of which the more distal is twice the length of the more proximal; ventro-caudal margin armed with (three and four

and one distal)[119] heavy and moderately elongate spines. Cephalic tibiae slightly over three times as long as greatest width. Median and caudal femora with cephalic margin armed with (three and one distal) heavy and elongate spines; caudal margin armed with (two and four and one distal for median femora, four and no distal for caudal femora) more elongate spines. Caudal metatarsus distinctly longer than combined length of succeeding joints, its ventral surface with two rows of short stout spines which diverge distad about the small globose pulvillus; second joint similar, but with rows of spines very short; third joint similar, but with proximal half unarmed; fourth joint with pulvillus occupying its entire ventral surface, with a few spines laterad. Arolium present only as a small node between base of claws.

General coloration of dorsal surface blackish brown, the lateral portions of the pronotum, costal field of the tegmina, very narrow lateral margins and narrow caudal margins of the dorsal abdominal segments, except the minute ridges which are blackish, of a somewhat metallic prout's brown. Under high magnification the chitinous structure is seen to be translucent, tinged with ochraceous-tawny and overlaid with blackish brown, this absolutely solid only on the pronotum and proximal portions of the tegmina, breaking into spots and dots in the paler areas and there resultantly having somewhat the appearance of tortoise shell. Cerci buffy tinged with tawny. Head shining blackish brown, except the vertex which has a narrow irregular suffused band of light ochraceous-tawny between the eyes, with three irregular longitudinal lines of this color running caudad. Ocellar dots ochraceous-tawny. Antennae beyond first joint and mouthparts slightly paler than face and showing a tawny tinge. Ventral surface of abdomen shining black. Limbs with spines all russet. Coxae blackish mars brown, shading to slightly paler distad; femora deep russet; tibiae russet; tarsal joints buffy with ventral rows of spines russet.

Length of body, 30.3; width of head, 5.6; length of antenna, 13; length of pronotum, 8; width of pronotum, 12.8; exposed length of tegmen along humeral trunk, 7.1: exposed length of tegmen along sutural margin, 4.8; width of tegmen, 8.9; width across tegmina, 15.6; width across first abdominal segment, 15.8; greatest width of abdomen (across third abdominal segment), 16.6; length of cercus, 1.8; length of cephalic tibia, 3; length of caudal femur, 7.2; length of caudal tibia, 9.2; length of caudal metatarsus, 3.2 millimeters.

A series of immature individuals, representing three of the earlier instars, are of interest in showing the brief longitudinal ridges at the caudal margins of the dorsal abdominal segments and also on the pronotum, mesonotum and metanotum, relatively more decided than in the adults. These specimens are not as polished and not as solidly dark, appearing dark prout's brown shading to prout's brown, while the smallest show a vague but broad medio-longitudinal dorsal abdominal band preceded on the metanotum by an inverted "V" of slightly paler coloration.

The antennae are, however, of particular interest. In the adult they are unicolorous with fifty-seven joints. In the instar fourteen millimeters in length they have thirty to thirty-seven joints, of which the fourteenth to sixteenth are

[119] On one side the distal spine is atrophied, a minute socket alone showing. A certain amount of general atrophy is shown by the structure and irregularity of the spines.

very faintly paler brown, the three joints preceding the last joint white. In the instar eleven millimeters in length they have twenty-nine joints of which the thirteenth to the fifteenth are very faintly paler brown, the three joints preceding the last joint white. In the instar eight millimeters in length they have twenty-four joints of which the tenth to the twelfth and the three joints preceding the last joint are white.

In all the arolia are of the same proportions as in the adult.

In addition to the type, the following series of immature examples is at hand.

Porto Bello, Panama, VIII, 18 to 21, 1916, (Harrower), 2 juv.
Gatun, Canal Zone, Pan., VII, 17 to VIII, 5, 1916, (Harrower), 3 juv.
Lion Hill, C. Z., Pan., VI, 18, 1907, (Busck), 1 juv.
Rio Trinidad, Pan., VI, 6, 1912, (Busck), 1 juv.

Epilampra azteca Saussure

1868. *Epilampra azteca* Saussure (in part), Rév. et Mag. de Zool., (2), xx, p. 356. [♂, Mexico.]

1870. *Epilampra azteca* Saussure (in part), Miss. Sci. Mex., Rech. Zool., vi, p. 82, pl. ii, fig. 45. (More detailed diagnosis and figure of wing.)

The Cuban material, originally included, and the South American material, later included by Saussure, represent distinct though allied species, described by Saussure and Zehntner in the Biologia Centrali-Americana.

Porto Bello, Panama, IV, 17 and 20, 1912, (Busck), 4 ♀; VIII, 18 to 22, 1916, (Harrower), 6 juv.
Gatun, Canal Zone, Pan., VI, 1915, (Harrower), 1 ♀, 1 juv.; VII, 17 to VIII, 22, 1916, (Harrower), 8 juv.
Rio Bejuco, Pan., (W. Schaus), 1 ♀.
Rio Trinidad, Pan., VI, 3, 1912, (Busck), 1 ♂, 1 ♀.
Paraiso, C. Z., Pan., I, 30 to II, 8, 1911, (Busck), 3 ♂, 1 ♀, 1 juv.
Cabima, Pan., V, 18 to 28, 1911, (Busck), 1 ♂, 3 ♀.
Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; in leaf litter in jungle), 1 ♀, 1 juv.
Panama City, Pan., 1913, (Zetek), 1 ♂, 1 ♀, [United States National Museum].
Chorrera, Pan., V, 14, 1912, (Busck), 1 ♂.

The present series shows but a moderate amount of variation. The three males from Paraiso are recessive in coloration, the pronotal picturing being cinnamon brown with chestnut flecks, rather than blackish chestnut brown as is usual. In such specimens the dark line and flecks along the humeral vein of the tegmina are also decidedly reduced and weakened. Additional material at hand, however, shows that this is by no means the extreme of recessive coloration attained in the species.

This insect is apparently the most abundant species of the genus in Panama. Its small size and heavily pictured pronotum readily distinguish it from the other species here treated.

Epilampra maya Rehn (Plate V, figure 7.)

1902. *Epilampra maya* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♂; Machuca, Nicaragua.]

1914. *Epilampra sodalis* Caudell (not of Walker, 1868), Insec. Inscit. Menst., ii, p. 79. [♀, juv.; Porto Bello Bay, Panama.]

Porto Bello Bay, Panama, (Jennings; in bromeliads), 3 ♀.
Rio Trinidad, Pan., V, 9, 1911, (Busck), 1 ♂.
Chorrera, Pan., IV, 13, 1912, (Busck), 1 ♂.

This broad, medium sized, rather light brown species appears, from consideration of the series at hand, to be one of the most abundant forms of the genus in Central America.

Under *sodalis* of Walker, Kirby has placed *conspersa* of Saussure and Zehntner, which action has been followed, without comment, by Shelford. We believe, from careful study of the literature and material at hand, that Saussure and Zehntner correctly diagnosed *conspersa* of Burmeister, which species belongs to the group having beautifully marmorate and tessellate tegmina.

From Walker's insufficient description of *sodalis*, we would note the following differences for the present species; front not solidly black, dorsal surface of abdomen lacking black patches and pronotum without even an indistinct lyre-shaped marking. Were an adequate description of *sodalis* given, we feel satisfied that more decided features of difference could be stated.

The present species has not been recorded from South America, nor is it represented in the large series of unstudied material from that continent at hand.

Epilampra colombiana Saussure

1895. *Epilampra colombiana* Saussure, Rév. Suisse Zool., iii, p. 360, pl. ix, fig. 13. [♀, "Nova Granada" (=Colombia).]

1896. *Epilampra mexicana* Griffini (not of Saussure, 1862), Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 2. [♀; Lake Pita, Darien, [Panama].]

1898. *E[pilampra] colombiana* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 311, p. 7. (Correcting Griffini's record and comparing this species with *mexicana*.)

This species is extremely close to *E. mexicana* Saussure and may eventually prove to be a geographic race of that insect. The tegmina with humeral vein showing no darker blotches is the most striking difference in coloration for *colombiana*. Saussure's figure gives a very good idea of the markings characteristic of this insect.

Tabernilla, Canal Zone, Panama, V, 14, 1907, (Busck), 3 ♀.
Cabima, Pan., V, 22, 1911, (Busck), 1 ♀.
Chiriqui, Pan., 1 ♀, [Hebard Collection].

Epilampra mexicana Saussure

1862. *E[pilampra] mexicana* Saussure, Rév. et Mag. de Zool., (2), xiv, p. 228. [[♂], Mexico.]
1864. *Epilampra mexicana* Saussure, Mém. l'Hist. Nat. Mex., iv., p. 130, pl. ii, fig. 26. (Detailed diagnosis and color figure.)
Chorrera, Pan., V, 11 and 17, 1912, (Busck), 2 ♀.

The type is more intensive in coloration than the material here recorded, or specimens from Mexico and Guatemala before us.

HYPORHICNODA new genus

The present genus shows close relationship to *Rhicnoda* Brunner, differing in the greater reduction and different type of limb armament,[120] in the wings of the male which show a more strongly Polyphagine tendency, absence of both tegmina and wings in the female, and in the medio-longitudinal carina, which is distinct on pronotum and mesonotum in the male and decided on pronotum, mesonotum and metanotum in the female.

GENOTYPE: *Hyporhicnoda reflexa* [*Rhicnoda reflexa*] (Saussure and Zehntner).

Generic Description.—Sexes very dissimilar. Male with fully developed tegmina and wings, smaller than female, which lacks organs of flight. Head with surface of occiput polished but showing impressed punctae mesad, interocular-ocellar area depressed,

[120] An immature specimen of the genotype, *Rhicnoda rugosa* Brunner, from Goenong Soegi, Lampong, Sumatra, is in the collection of the Academy of Natural Sciences. This specimen has the ventro-cephalic margin of the cephalic femora armed with (five) moderately elongate, heavy spines, succeeded by a row of minute spines, which are closely placed distad, terminated by a single heavy spine; the ventro-caudal margin of the cephalic femora and the ventro-cephalic margin of the median and caudal femora are armed with (three and one distal) moderately elongate, heavy spines. The ventro-caudal margin of the median and caudal femora are armed with (median four and one distal; caudal three or four and no distal) shorter and lighter spines.

thickly impresso-punctate and pitted. Eyes small, widely separated. Antennae short.

Pronotum extending well beyond head; margin cephalad subcingulate, evenly convex and moderately reflexed to latero-caudal angles, which are weakly produced caudad in female only; caudal margin in male weakly convex, in female weakly concave on each side, weakly convex mesad. Pronotum and mesonotum showing a medio-longitudinal carina, this continued on metanotum in female. Female with caudal margin of pronotum, mesonotum, metanotum and dorsal abdominal segments minutely but conspicuously beaded. Tegmina of male delicate, extending well beyond apex of abdomen, widest distad, apex broadly rounded; marginal and anal fields proximad impresso-punctate, remaining portions with veins showing numerous minute swellings but no hairs. Wings of male with anterior field extending much beyond radiate field; proximal portion of radiate field not folding when wings are closed, remaining portion folding as is usual in the Epilamprinae.[121] Dorsal abdominal segments with latero-caudal angles weakly produced caudad.

Supra-anal plate feebly bilobate, subchitinous in male, heavily chitinous in female. Cerci moderately elongate in male, short and lamellate in female. Limbs showing decided atrophy of all spines, surfaces impresso-punctate, with ventro-cephalic and ventro-caudal margins of femora roughly carinate.

Ventro-cephalic margin of cephalic femora armed with (one to four) short, heavy, irregular spines, succeeded by an irregular row of very minute, short spines, terminated by a small but heavy, though plainly decidedly atrophied, spine; other ventral femoral margins unarmed, except rarely with a single heavy, though greatly atrophied, spine on the cephalic margin of the median or caudal femora. Dorsal genicular spines of median and caudal femora small but heavy, though greatly atrophied. Caudal metatarsus elongate, with two rows of spines ventrad and a row of more distantly placed spines on each side. Four proximal caudal tarsal joints supplied distad with moderately well developed pulvilli. Small arolia present in male, subobsolete in female.

[121] This type of wing is clearly a transition toward the types found in the Corydiinae and Polyphaginae.

Hyporhicnoda reflexa (Saussure and Zehntner) (Plate V, figures 8 and 9.)

1893. *Rhicnoda reflexa* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 68, pl. iv, fig. 35. [juv.? ♂; Chontales, Nicaragua.]

It is evident from the figure that the type is an immature male.

Porto Bello, Panama, III, 14, 1911, (Busck), 1 ♀.

Gatun, Canal Zone, Pan., VI, 1915, (Harrower; under logs) 1 juv.? ♀; VII, 28 to VIII, 22, 1916, (Harrower; under logs), 5 ♀.

Rio Trinidad, Pan., VI, 3, 1912, (Busck), 1 juv. ? ♀.

In addition we have a male from the Hebard Collection, taken at Ujurrás de Térraba, head of Rio Ceibo, Costa Rica, 7000 to 8000 feet, September 10, 1907, by M. A. Carriker Jr., which has enabled us to diagnose this remarkable genus for both sexes. The measurements for this individual are: length of body, 21; length of pronotum, 5.9; width of pronotum, 9.2; length of tegmen, 21.9; width of tegmen, 8.2; length of anterior field of wing, 20; greatest length of radial field of wing, 15.1; length of caudal tibia, 7.7 mm.

For the unquestionably adult females the measurements are: length of body, 25.1 to 26.4; length of pronotum, 7.8 to 8.6; width of pronotum, 12 to 13.3; length of caudal tibia, 6.8 to 8 mm.

Both sexes are uniform brown in general coloration, the male lighter than the female.

Subfamily BLATTINAE

Lamproblatta albipalpus Hebard (Plate V, figures 10 to 12.)

1919. *Lamproblatta albipalpus* Hebard, Trans. Am. Ent. Soc., xl, p. 109, pl. xvii, figs. 7, 8 and 9. [♂, ♀; Cincinnati, Sierra Nevada de Santa Marta, Magdalena, Colombia; Venezuela; the present material.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 22, 1916, (Harrower), 2 ♂, 2 ♀, 1 large juv. ♀, 2 small juv.

Obispo Station, C. Z., Pan., VII, 6 to 11, 1871, (Steindachner), 1 ♂, 1 ♀, [Museum of Comparative Zoology].

Zone limit three miles west of Empire, C. Z., Pan., IX, 14, 1913, (Hebard; in rubbish under vines on edge of jungle), 1 ♂, 1 ♀.

Corozal, C. Z., Pan., XI, 13 and 17, 1913, (Hebard; under decayed banana stem lying in jungle), 1 ♂, 1 ♀, 3 juv. ♂, 6 juv. ♀.

Old Panama, Pan., XI, 13, 1913, (Hebard; under drift on edge of coral sand beach), 1 juv. ♀.

Tabogilla Island, Pan., II, 16, 1912, (Busck), 1 ♀, 2 juv. ♂, 2 juv. ♀.

Taboga Island, Pan., II, 23, 1912, (Busck), 1 juv. ♂.

The present series of this small shining black species, having white palpi and entirely lacking tegmina and wings, has been fully treated with the original description.

Pelmatosilpha rotundata Scudder

1900. *Pelmatosilpha rotundata* Scudder, Proc. Davenport Acad. Nat. Sci., viii p. 93, pl. ii, fig. 5. [♂, Texas (*type*): ♀, Panama.]

Porto Bello Bay, Panama, (Jennings; in epiphytic Bromeliad), 1 ♂.

This large shining blackish roach, with large, convex and broadly rounded tegmina, has already been correctly recorded by Caudell.

Eurycotis biolleyi Rehn

1918. *Eurycotis biolleyi* Rehn, Trans. Am. Ent. Soc., xliv, p. 321, pl. xviii, figs. 1 to 4. [♂, ♀; ten Costa Rican localities.]

Boquete, Panama, III, 2, 1914, (Zetek), 1 ♀, [United States National Museum].

The present specimen is slightly larger than any of the originally treated females of this shining blackish brown species, which possesses lateral pad-like tegmina. A very decided amount of cephalic size variation is shown in this insect, the size of the head, however, increasing regularly with that of the body.

Measurements (in millimeters)

♀	Length of body	Greatest width of abdomen	Length of head	Width of head
Tablazo, Costa Rica, *allotype*	20.2	11.8	5.3	4.9
Itiquis, Costa Rica, *paratype*	24	12.1	5.9	5.4
Santa Maria de Dota, Costa Rica, *paratype*	26	12.8	6	5.6
La Palma, Costa Rica, *paratype*	27.8	13.1	7	6.4
Boquete, Panama	30.5	15	7.3	6.8

Eurycotis pluto new species (Plate V, figure 13.)

The present uniform shining blackish insect is the largest yet described species of the genus. It belongs to the group of relatively slender forms having lateral pad-like tegmina.

The species is very closely related to *E. biolleyi* Rehn, differing in its great size and relatively narrower form, the greatest abdominal width being contained distinctly over twice in the body length, approximately twice in *biolleyi*.

Relationship with the Brazilian *E. manni* Rehn also exists; comparison with the male type shows that species to be absolutely black, decidedly smaller, with caudal metatarsi proportionately very decidedly shorter.

Type.— ♀ ; Porto Bello, Panama. March 2, 1911. (A. Busck.) [United States National Museum.]

Size extremely large; form elliptical, depressed, relatively slender for the genus. Surface polished. Head with occiput transversely evenly convex, interocular space very broad, slightly broader than width between antennal sockets; ocellar spots distinct; antennae elongate, not equal to body length. Maxillary palpi with fifth joint not strongly enlarged, subequal in length to fourth; fourth about three-quarters as long as third joint.

Pronotum of the usual form for the genus; surface smoothly convex, briefly and suddenly deflexed on either side of the head; caudal margin straight laterad, showing a very feeble broad convexity mesad. Mesonotum with caudal margin much as that of pronotum. Metanotum with latero-caudal angles slightly but appreciably produced, sharply rectangulate, the lateral portions of the caudal margin resultantly distinctly concave. Tegmina lateral, slightly surpassing the caudal margin of the mesonotum, length of exposed portion one and one-half times greatest width; costal margin very feebly convex, weakly cingulate, apex subrectangulate and rather sharply rounded; sutural and distal margins regularly convex, the angle formed by their juncture obtuse and broadly rounded. Wings absent.

Abdomen elongate, scarcely broader than thorax and with surface very slightly less convex; disto-dorsal abdominal segments with latero-caudal angles showing distinct but not pronounced acute projections directed caudad. Supra-anal plate partly deformed.[122] Cerci fusiform; dorsal surface flat, showing the sutures of the joints weakly; apex acute; ventral surface of (thirteen) joints strongly convex with lateral margins narrowly but strongly cingulate, this greater for the external margins.

Femora heavily spined as characteristic of the genus. Caudal tibiae elongate, flattened, slender, unspecialized. Caudal tarsi very elongate; metatarsus slender, approximating the combined length of the succeeding joints, ventral surface with two rows of widely spaced minute spines, terminating distad at the moderately large globose pulvillus; succeeding three joints with ventral surfaces fully occupied by large pulvilli. Decidedly small arolia present between the bases of the tarsal claws.

Dorsal surface shining blackish with a very slight brown tinge. Head the same color, ocellar spots ochraceous-buff; a small spot on either cheek, entire clypeus, jaws and ventral half of labrum chestnut. Antennae in brief proximal portion shining blackish with a very slight brown tinge, remaining portions dull bay. Underparts, coxae and proximal portions of femora chestnut, becoming blackish chestnut distad on abdomen and distal portions of limbs. Pulvilli ochraceous-buff.

Length of body, 49.2; length of head, 10.3; width of head, 9.2; width of interocular space, 5.9; length of pronotum, 13; width of pronotum, 19; exposed length of tegmen, 6.7; width of tegmen, 4.8; width across mesonotum and tegmina, 20.7;

[122] From the normal portion, apparently as in this sex of *biolleyi*.

greatest width of abdomen, 21.6; length of caudal tibia, 17.7; ventral length of caudal metatarsus, 6 millimeters.

The type of this interesting species is unique.

Periplaneta americana (Linnaeus)

1758. [*Blatta*] *americana* Linnaeus, Syst. Nat., Ed. X, p. 424. [America.]

1917. *Periplaneta americana* Hebard, Mem. Am. Ent. Soc., 2, p. 178, pl. vii, figs. 3 to 11. (Detailed diagnosis.)

Gatun, Canal Zone, Panama, VII, 28 to VIII, 22, 1916, (Harrower), 3 ♂, 3 ♀, 1 juv.

Balboa, C. Z., Pan., VI, 8, 1916, (Harrower), 1 ♂.

This and the following three species are domiciliary insects, widely distributed through tropical America.

Periplaneta brunnea Burmeister

1838. *P[eriplaneta] brunnea* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 503. [♂, ♀; Chile; Demerara [= British Guiana].]

1896. *P[eriplaneta] truncata* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, ix, no. 236, p. 4. [♂, ♀; Rio Lara, Darien.]

1917. *Periplaneta brunnea* Hebard, Mem. Am. Ent. Soc., 2, p. 182, pl. vii, figs. 12 to 16. (Detailed diagnosis.)

Porto Bello, Panama, III, 18, 1911, (Busck), 1 ♂.

Gatun, Canal Zone, Pan., VIII, 6 to 22, 1916, (Harrower), 5 ♂.

Periplaneta australasiae (Fabricius)

1775. [*Blatta*] *australasiae* Fabricius, Syst. Ent., p. 271. ["In nave e mare Pacifico et regionibus incognitis revertente."]

1917. *Periplaneta australasiae* Hebard, Mem. Am. Ent. Soc., 2, p. 185, pl. vii, figs. 17 to 19. (Detailed diagnosis.)

Gatun, Canal Zone, Panama, VII, 28 to VIII, 22, 1916, (Harrower), 1 ♂, 1 ♀, 2 juv.

Rio Trinidad, Pan., VI, 6, 1912, (Busck), 1 ♂.

Argas, Pan., IV, 28, 1911, (Busck), 2 juv.

Subfamily PANCHLORINAE

Pycnoscelus surinamensis (Linnaeus)

1767. [*Blatta*] *surinamensis* Linnaeus, Syst. Nat., Ed. XII, p. 687. [Surinam.]

1917. *Pycnoscelus surinamensis* Hebard, Mem. Am. Ent. Soc., 2, p. 193, pl. viii, fig. 1. (Detailed diagnosis.)

Canal Zone, Panama, 1907, (Busck), 1 ♀.

This is a circumtropical species, widely distributed throughout tropical America.

Pycnosceloides aporus Hebard (Plate V, figure 14.)

1919. *Pycnosceloides aporus* Hebard, Trans. Am. Ent. Soc., xlv, p. 300, figs. 1 and 2. [♀, juv.: Brownsville, Texas; Monte Diablo, California; Orizaba, Motzorongo and Minatitlan, Vera Cruz, Mexico; material here recorded.]

Porto Bello, Panama, II, 18 and 24, 1911, (Busck), 1 ♀, 2 juv. ♀.
Alhajuela, Pan., IV, 4 to 17, 1911, (Busck), 2 juv. ♂, 5 juv. ♀.
Rio Chilibre, Pan., IV, 14, 1911, (Busck), 1 juv. ♀.
Rio Trinidad, Pan., V, 4, 1911, (Busck), 2 juv. ♂, 1 juv. ♀.
Cabima, Pan., V, 22 and 24, 1911, (Busck), 2 juv. ♂, 6 juv. ♀.
Corozal, Canal Zone, Pan., XI, 17, 1913, (Hebard; in jungle under decaying banana stem in which were boring individuals of *Litopeltis bispinosa* (Saussure)), 2 juv. ♀.

This remarkable genus and species which, at least in the adult females, appears to retain the immature form in full, has recently been fully discussed with the original description. This retention of immature form is a feature hitherto unknown in the Panchlorinae, unless, as there stated, it sometimes occurs in *Pycnoscelus surinamensis* Linnaeus).

Close resemblance is shown to individuals of the latter species lacking organs of flight. The present species is distinguished by the distal abdominal segments being similarly roughened, but not to a like degree, and in consequence not as sharply and decidedly in contrast with the remaining polished dorsal surface, while the caudal margins of these segments are more strongly beaded. The limbs are shorter, the ventro-cephalic margin of the cephalic femora with a fringe of hairs, which does not increase considerably in length proximad, while all the ventral femoral margins are without spines, even distad, except the caudal margin of the caudal femora, which bears mesad a single small spine, rarely with another smaller proximal spine. The dorsal genicular spine of the median and caudal femora is slighter. The tarsal claws are more elongate and slender, with a smaller arolium between. The coloration is very similar, blackish brown with a chestnut tinge above, much paler below, with occiput and ocellar areas paler than face.

The discovery of the adult male of this species is awaited with interest.

Panchlora cubensis Saussure

1862. *P[anchlora] cubensis* Saussure, Rév. et Mag. de Zool., (2), xiv, p. 230. [♀, Cuba.]

1896. *P[anchlora] viridis* Griffini (not *Blatta viridis* Fabricius, 1775), Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 4. [♂, ♀; Punta di Sabana and Ciman, Darien.]

1917. *Panchlora cubensis* Hebard, Mem. Am. Ent. Soc., 2, p. 198, pl. viii, figs. 2 to 5. (Detailed diagnosis.)

Pinogana, Darien, Panama, XII, 1915, (Muñoz), 1 ♂, [Hebard Collection].
Porto Bello, Pan., II, 15 to III, 16, 1911, (Busck, Jennings), 7 ♂, 5 ♀.
Caldera Island, Porto Bello, Pan., (Jennings), 7 ♂.
Gatun, Canal Zone, Pan., VII, 28 to VIII, 22, 1916, (Harrower), 2 ♀.
Alhajuela, Pan., IV, 17, 1911, (Busck), 1 ♀.
Limon Plantation, Chagres River, Pan., VII, 14, 1918, (Dietz and Zetek), 1 ♀.
Rio Trinidad, Pan., III, 19, 1912, (Busck), 1 ♀.
Tabernilla, C. Z., Pan., V, 4 to VI, 14, 1907, (Busck), 3 ♂, 1 ♀.
Paraiso, C. Z., Pan., I, 18 to II, 3, 1911, (Busck, Schwarz), 2 ♀.
Cabima, Pan., V, 17, 1911, (Busck), 1 ♀.
Corozal, C. Z., Pan., IV, 7, 1911, (Busck, at light), 1 ♂.
Ancon, C. Z., Pan., (Jennings), 1 ♀.
Tabogilla Island, Pan., II, 21, 1912, (Busck), 1 ♀.
Taboga Island, Pan., II, 20 to VI, 14, 1911 and 1912, (Busck), 3 ♂, 2 ♀.

Very great size variation is shown by the present series of this common and widely distributed delicate green roach. The extremes of the series are given below.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Pinogana	11.2	3.8	4.5	13	3.9
Porto Bello	10.8	3.7	4.1	12	3.7
Porto Bello	14	4.4	5.1	16	4.7
Tabernilla	12.2	4	4.9	13.7	4
Corozal	10.7	3.7	4.1	12.7	3.8
♀					
Porto Bello	16.4	5.1	6	18.5	5.7
Porto Bello	18.3	5.6	6.9	19.6	6.3
Porto Bello	19.5	6	7.4	20.8	6.8
Gatun	17	5.2	6.2	18.8	5.6
Gatun	20.8	6	7.1	21	6.2
Tabernilla	18.5	5.8	6.8	19.9	5.9
Paraiso	15.5	4.9	5.8	17	4.9
Paraiso	19.5	5.4	6.6	19.1	5.4

Every specimen in the series has a single black dot meso-distad on the tegmina. Only one specimen, the largest female from Porto

Bello, has an additional minute black dot in the discoidal field meso-proximad.

The males have the eyes varying from subattingent to actually attingent. The females have the interocular space varying from slightly over one-third to slightly less than one-fourth the greatest ocular depth, excepting one individual in which the interocular space is distinctly narrower.

Panchlora exoleta Burmeister

1838. *P[anchlora] exoleta* Burmeister, Handb. Ent., ii, abth. ii, part 1, p. 507. [Pará and Bahia, Brazil.]

1893. *Panchlora punctum* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 96. [♀; Central America.]

Chiriqui, Panama, 1 ♀, [Hebard Collection].

From the three line description of *punctum*, we are led to believe that this name is based on the large condition of *exoleta* here discussed, which is found in northwestern South America and in Central America. The interocular width is described as almost greater than that of the eye in the type of *punctum*. This is considerably greater than in any female here discussed, but a feature of decided variability in the present species and also known to be exceedingly variable in the closely related *P. cubensis* Saussure.

From *cubensis*, males of *exoleta* are separable by the somewhat more depressed inter-ocular-ocellar area,[123] the stronger distal obtuse-angulate emargination of the supra-anal plate, longer cerci, and styles which are very minute, one-fifth to less than one-sixth as long as the cerci (in *cubensis* one-third to about one-fourth as long as the cerci). As has been noted, females are separable solely by their average decidedly larger size. The margins of the pronotum and marginal fields of the tegmina are often slightly more opaque, but this feature is not strikingly developed, shows some individual variation and is on the whole of little value.[124]

Though males of *exoleta* from eastern Peru, Brazil and Argentina, show but little greater size development than is usual in *cubensis*, and females are only above the average, not above the maximum, for that species, a male at hand from Alpayacu, Oriente, Ecuador, and a large series of males from Bogotá and Villavicensio, Cundi-

[123] This feature is not constant. It is distinctly apparent only in some series.

[124] It is further to be noted that, in alcoholic material, this condition is decidedly intensified.

namarca, Colombia, are as large as females of *cubensis*, while the Panamanian female here recorded, one from Yuto, Jujuy, Argentina and a large series of this sex from the Colombian localities mentioned above, are very decidedly larger than any female of *cubensis* in the very large series of that species before us.

It is therefore evident that in northwestern South America and in Central America alone, *exoleta* is of very decidedly greater size than *cubensis*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Bogotá, Colombia (5)	14.9–16.1	4.9–5.4	5.9–6.4	17.9–20	5.4–6.1
Villavicensio, Colombia (32)	15.1–17.8	4.8–5.3	5.7–6.4	17.9–20	5.3–5.9
Alpayacu, eastern Ecuador	17	5.2	6.3	20.2	6.2
Cantumayo, eastern Peru (4)	13.3–15.5	4.3–4.9	4.9–5.6	15.1–16.8	4.8–5.4
Marmoré Railroad, Brazil[125]	13.8	4.4	5.2	15.7	4.9
Igarapé-Assú, Brazil[126] (2)	14–13.8	4.1–4.6	4.8–5.1	15–15.4	4.2–4.8
Yuto, Jujuy, Argentina[127]	12.2	4.2	4.9	15.4	4.2
♀					
Chiriqui, Panama	24	6.4	7.9	24.4	7.2
Bogotá, Colombia	23	6.8	8	25.3	8.1
Villavicensio, Colombia (19)	19.8–24.2	6.2–7.3	7.7–9.2	23.7–26.8	7–8.5
Cantumayo, eastern Peru (2)	17.9–20	5.5–6.1	6.8–7.9	20–22	5.9–7
Igarapé-Assú, Brazil	23	6	7	21.2	6.2
Yuto, Jujuy, Argentina	23.1	6.8	8	22.3	7

Panchlora colombiae Hebard

1919. *Panchlora colombiae* Hebard, Trans. Am. Ent. Soc., xlv, p. 115, pl. xviii, fig. 3. [♂, ♀; La Cumbre and Cauca, Colombia.]

Porto Bello, Panama, II, 28, 1911 and IV, 21, 1912, (Busck), 2 ♂.
Rio Trinidad, Pan., III, 23, 1912, (Busck), 1 ♂.

This is the only plain green species of the genus known from

[125] Correctly recorded by Rehn, Trans. Am. Ent. Soc., xlii, p. 239, (1916).
[126] Correctly recorded by Rehn, Proc. Acad. Nat. Sci. Phila., 1918, p. 161, (1918).
[127] This we believe to be the only correct record for this species from Argentina, as Rehn's record of *exoleta* from the Misiones is based on material of other species.

Central America, which has the male subgenital plate strongly asymmetrical, produced sinistrad.

The specimens here recorded are smaller and have less elongate tegmina than the males originally described, while the eyes are more approximate, subattingent in two, attingent in one individual.

When compared with males of *P. cubensis* Saussure, these individuals are seen to be slightly broader with surface more shining, much as in *P. minor* Saussure and Zehntner.

Panchlora minor Saussure and Zehntner (Plate V, figure 15.)

1893. *Panchlora acolhua*[128] variety *minor* Saussure and Zehntner, Biol. Cent.-Am., Orth. i, p. 95. [♀; Bugaba, Panama.]

1893. *Panchlora fraterna* Saussure and Zehntner, Biol. Cent.-Am. Orth., i, p. 97. [♂, ♀; Chontales, Nicaragua; Volcan de Chiriqui, Panama.]

Rio Trinidad, Panama, V, 3, 1911, (Busck), 2 ♀.

Tabernilla, Canal Zone, Pan., V, 4, 1907, (Busck), 1 ♂.

This is a plain green species of the genus, having a blackish mesodistal antennal annulus. The male genitalia were not originally described, and we have thought it best to figure them for this reason.

The two females at hand have the interocular space showing marked difference; in one equalling one-fourth the ocular width, in the other over half the ocular width. In this sex the median portion of the free margin of the subgenital plate is transverse, normally showing no concavity whatever.

The dark antennal annulus occupies one to three joints in the present series.[129]

Panchlora translucida Kirby

1862. *Panchlora hyalina* Saussure (not *Blatta hyalina* Stoll, 1813), Rév. et Mag. de Zool., (2), xiv, p. 231. [[♀]; Guatemala.]

1893. *Panchlora hyalina* Saussure and Zehntner (not *Blatta hyalina* Stoll, 1813), Biol. Cent.-Am., Orth., i, p. 96. [♂, Cuba: ♀, Guatemala.]

1903. *Panchlora translucida* Kirby, Ann. Mag. Nat. Hist., (7), xii, p. 378. (New name.)

[128] We here select as type of *acolhua* the unique female, described from the State of Guerrero, Mexico. The specimens recorded as an unnamed variety of that species from Capetillo, Guatemala, are either small examples of *acolhua*, or large individuals of *minor*, while those described as *fraterna* are clearly the same as those described as *acolhua* variety *minor*.

[129] In other specimens of the species at hand it occupies seven to nine joints.

Limon Plantation, Rio Chagres, Panama, VII, 14, 1918, (Dietz and Zetek; sweepings around corn field), 1 ♀, [United States National Museum].

This species is closely related to *P. minor* Saussure and Zehntner, agreeing in shining coloration and annulate antennae. It differs in the female sex in the larger size, slightly broader form, greater interocular space, which fully equals the ocular width, and in the median portion of the free margin of the subgenital plate, which is not straight transverse, but shows a weak and broad concavity, as much as that at the cercal bases.

The dark antennal annulus occupies four and six joints in this specimen.

Phortioeca phoraspoides (Walker) (Plate VI, figure 1.)

1871. *Zetobora phoraspoides* Walker, Cat. Derm. Saltat. Brit. Mus., v, Suppl. Blatt., p. 8. [♂; Chontales, Nicaragua.]

1893. *Zetobora sublobata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 102. [♂; Pantaleon, Guatemala.]

Cabima, Panama, V, 22, 1911, (Busck), 1 ♂, 2 ♀, 14 juv. in 3 instars.

This roach, though handsome in the adult winged condition, with pronotum black, ochraceous-buff meso-cephalad and ferruginous latero-cephalad, is even more striking in the immature stages (see plate VI, fig. 1). Then individuals are ochraceous-buff to ochraceous-tawny, showing a beautiful, intricate and symmetrical heavy pattern of black. In the immature stages only, this species is strongly patelliform.[130]

This species has also been recorded from San Carlos, Costa Rica.

CAPUCINELLA new genus

This genus is closely related to *Capucina* Saussure, agreeing in general character of structure, but differing in the smaller size, head with face flat but not concave, very delicate but not at all coriaceous pronotum and shorter distal tarsal joint, with arolium proportionately more ample.

Furthermore the sexes of the present genus are very different in general appearance. The male has the organs of flight fully developed, more so than in *Capucina*, the pronotum somewhat less

[130] We use this term to characterize the type of roach which is flattened, weakly convex above and concave beneath. Such structure enables the individual to press itself closely under bark or debris and doubtless when approached to retract head, antennae and limbs, leaving exposed only the protected dorsal surface. A genus of limpets bears the name *Patella*.

transverse, and the tegmina very delicate and not at all coriaceous, with venation less crowded.

The female entirely lacks organs of flight and agrees with nymphal material of the genus *Capucina* in having all of the dorsal segments produced laterad, this in proportion to the production of the pronotum cephalad, but narrowing caudad, and there in like proportion to the production of the supra-anal plate.

Thus in *Capucinella*, unlike in *Capucina*, the remarkable patelliform[131] type of the immature condition is retained in adults of the female sex.

GENOTYPE: *Capucinella delicatula* new species.

Generic Description.—Male. Head very small, interocular space very narrow, entire face flat. Antennae delicate, decidedly shorter than body, first joint very elongate, cylindrical. Maxillary palpi very short. Pronotum extending beyond head a distance nearly equal to the cephalic length, structure extremely delicate; surface feebly and finely vermiculate-cribrose without minute nodules, cucullate above head, not reflexed, meso-laterad broadly and distinctly depressed, concave; cephalic and caudal margins very feebly cingulate, equally rather strongly convex to lateral angles, which are at a point mesad between the cephalic and caudal extremities, these angles very slightly less than rectangulate and very sharply rounded. Tegmina very delicate, broad, extending beyond apex of abdomen a greater distance than in *Capucina*, with apex broadly rounded; delicate veins in anal and discoidal fields rather widely spaced and connected by numerous transverse veinlets. Wings very delicate, intercalated triangle absent. Abdomen broad, lateral margins of dorsal segments dilated, latero-caudal angles rounded, but little produced caudad. Genitalia characteristic of the Panchlorinae.

Female. Head broader than in male but in general similar, except that the eyes are strongly reduced and are resultantly separated by a very wide space, while the antennae are much shorter. The pronotum is delicate, but not as extremely delicate as in the male

[131] This term is used to characterize the type of roach which is flattened, weakly convex above and concave beneath. The name is derived from that of the genus of limpets called *Patella*.

and has the caudal margin less convex, the pronotum being resultantly more transverse, with lateral angles distinctly caudad of a median point between the cephalic and caudal extremities. Tegmina and wings absent. Form strongly patelliform, with lateral margins of all the dorsal segments decidedly more produced than in the male. Subgenital plate simple.

Both sexes with limbs slender, but not elongate. Cephalic femora with ventro-cephalic margin armed distad with a row of minute chaetiform spines, terminated by a single minute but stout distal spine; other ventral femoral margins unarmed. Median and caudal femora with a minute but stout dorsal genicular spine. Cephalic tibiae moderately elongate; all tibiae armed with small spines. Tarsi very short, proximal four joints with ventral surfaces fully occupied by large pulvilli, except proximal portion of metatarsus. Large arolia present between tarsal claws.

Capucinella delicatula new species (Plate VI, figures 2 and 3.)

This species is very distinctive. From a purely superficial standpoint, the male resembles more closely males of *Homalopteryx laminata* Brunner, than any other species at hand.

Type.— ♀ ; San Lorenzo, Sierra Nevada de Santa Marta, Magdalena, Colombia. Elevation, 7000 to 8300 feet. August 23, 1913. (M. A. Carriker Jr.) [Hebard Collection, Type no. 516.]

Size small, but larger than male. Form broad. Eyes strongly reduced, separated by a very wide space, equalling four times the narrow occipital ocular width. Maxillary palpi very short, fifth joint equal in length to third, slightly longer than fourth joint. Antennae not three times as long as head; first joint elongate cylindrical, narrowing in proximal third, four times as long as greatest width; second joint slightly narrower, slightly longer than wide; third joint distinctly narrower, twice as long as wide; succeeding joints grading from shorter than wide to over twice as long as wide distad. Tegmina and wings absent.

Dorsal surface with a medio-longitudinal line which develops into a very fine and weak carina in the cucullate portion of the pronotum. Mesonotum, metanotum and dorsal abdominal segments with latero-caudal angles slightly produced latero-caudad and distinctly less than rectangulate, sixth dorsal abdominal segment and supra-anal plate produced as far as the cercal apices. Cerci very small, lateral margins entire, dorsal surface deplanate, ventral surface strongly convex proximad, thence weakly convex in median portion distad. Supra-anal plate about one and three-fifths times wider than long, lateral margins straight and moderately diverging beyond cercal bases to broadly rounded latero-caudal angles, caudal margin straight,

transverse. Subgenital plate simple, truncate meso-distad, reaching scarcely beyond cercal bases, margin slightly concave beneath cercal bases. Limbs, armament and other features given in generic description.

Allotype.—♂; Porto Bello, Panama. March 10, 1911. (E. A. Schwarz.) [United States National Museum.]

Size small, form moderately broad. Eyes large, subattingent. Maxillary palpi with fourth and fifth joints subequal in length, each slightly shorter than third. Antennae much more elongate than in female, but with joints very similar except that the distal joints grade to three times as long as wide. Caudal margin of pronotum showing weak convexities on each side above the humeral trunk of the tegmina. Tegmina extending beyond apex of abdomen a distance equal to the tegminal width; marginal field occupied by an irregular network of very fine veinlets; discoidal field with (eight) moderately radiating discoidal sectors; anal sulcus curving sharply distad toward sutural margin. Wings with (six) incomplete and (three) complete branches of the ulnar vein.

Dorsal surface of the abdomen with third, fourth and fifth segments each showing along delicate transverse ridge proximad; latero-caudal angles of segments not produced, rectangulate, with apices rather broadly rounded, except those of seventh segment which are weakly produced, subrectangulate with apex rather sharply rounded, eighth segment concealed. Supra-anal plate exceedingly delicate, produced, nearly twice as broad as long; caudal margin almost transverse, very feebly convex; latero-caudal angles very broadly rounded. Cerci short, delicate, not extending as far as caudal margin of supra-anal plate. Subgenital plate roundly produced sinistrad a distance slightly over half that of supra-anal plate, forming dextrad a large and weakly obtuse-angulate emargination, from the apex of which springs a slender, straight style, three-quarters as long as the adjacent cercus, with apex furnished with a few minute hairs.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tarsal joint
Porto Bello, Panama, *allotype*	13.5	4.9	7.2	14.2	5.7	1.1
♀						
San Lorenzo, Colombia, *type*	16.5	4.9	8.3	—	—	1
From Colombia, adventive at New York	14.2	4.7	8.1	—	—	1

Pronotum transparent, hyaline with a faint buffy tinge, except for the meso-caudal area, which, in a rather broad, inverted V-shaped space with lateral margins concave, is russet, showing microscopic scattered flecks of buff. Tegmina and wings transparent, hyaline with a faint buffy tinge, the tegmina in a few minute

flecks and patches washed with cinnamon brown.[122] Remaining portions of dorsal surface light ochraceous-buff, washed with russet toward the tegminal and wing bases on mesonotum and metanotum and shading to ochraceous-buff meso-distad on abdomen. Head, ventral surface and limbs ochraceous-buff, this slightly deeper on femora. Eyes blackish mummy brown. Antennae ochraceous-buff proximad, shading to mummy brown in remaining portions (over two-thirds), except terminal joint which is ochraceous-buff. Cephalic tibiae with a minute fleck of prout's brown proximad on cephalic face, so that this is concealed by the slightly produced and rounded genicular lobe of the cephalic femora when the limbs are flexed.

Female. Buffy in general coloration, the dorsal surface covered with a microscopic network of a cinnamon brown incrustation. Underparts lighter buffy. Head with a weak, irregular, mottled and rather narrow interocular band of prout's brown, and a blackish interocellar band, this latter continued briefly beneath each of these points. Antennae more sharply mummy brown mesad than in male, with (three to five) distal joints pale buff. Cerci with a heavy band of blackish brown occupying their median half.

In the adventive specimens, here recorded, the interocellar band sends a median suffusion ventrad to the labrum, the face thus bearing a heavy, blackish, roughly T-shaped marking.

In addition to the type and allotype, the following material is before us.

San Lorenzo, Sierra Nevada de Santa Marta, Magdalena, Colombia, VIII, 23, 1913, (M. A. Carriker, Jr.), 1 juv., 3 small juv., taken with type, [Hebard Collection].

At quarantine, New York, received in orchids imported from Bogotá, Columbia, V, 1915, (H. B. Shaw), 2 ♀, [United States National Museum].

Subfamily BLABERINAE

Archimandrita tessellata Rehn

1903. *Archimandrita tessellata* Rehn, Trans. Am. Ent. Soc., xxix, p. 287. [♂; San Carlos, Costa Rica.]

Panama, (Harrower), 1 ♂.

Colon, Pan., V, 1913, (Zetek), 1 ♂, [Hebard Collection].

Tabernilla, Canal Zone, Pan., I, 1907, (Busck), 1 ♂.

Gorgona, C. Z., Pan., (Jennings), 1 ♂.

The present species is the largest and has the broadest tegmina of the Central American Blaberinae. This and the tessellate tegmina readily distinguish the species from any of the forms of the genus *Blaberus*.

[122] This may be due to the specimen being slightly soiled, rather than to it's pigmentation. We would note that whereas our series of *Capucina patula* (Walker), from Costa Rica, all show an incrustation to varying degrees on pronotum and tegmina, none have these portions covered by "velvety pile", as described for the synonymous *cucullata* by Saussure and Zehntner (Biol. Cent. Amer., Orth., i, p. 103, (1893)).

This insect was described as smaller than *A. marmorata* (Stoll). From careful consideration of the literature, the type, and a series of twenty-one Central American examples of the genus at hand, we have reached the following conclusions.

Stoll's *marmorata*[133] is an insect averaging distinctly smaller in size than *tessellata*, but having the interocular space decidedly wider. It is represented by material before us from Nicaragua only, and *tessellata* may prove to be a large southern race of that species. The material recorded by Rehn as *marmorata* from Colombia, represents instead *tessellata*, which we believe is also the case for all other material previously recorded from Costa Rica southward. Rehn was unacquainted with true *marmorata* at the time of the description of *tessellata*.

To show the exact differences from which we feel justified in holding *tessellata* as a valid species, we give the following measurements (in millimeters).

♂	Width of interocular space	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
marmorata					
San Marcos, Nicaragua	1.7	14	21.8	50	22.3
tessellata					
Tarbaca, Costa Rica	1.1	15.3	23.4	59.5	24.4
San Carlos, Costa Rica	1	16.1	26.2	62.8	26.8
Gorgona, Panama	1	16.6	25.2	68.3	27.9
Colon, Panama	1.2	17.2	28	70	29.9
♀					
marmorata					
Nicaragua	2	14.1	22.1	42	21.7
Nicaragua	2	13.9	22.3	41.8	21.3
tessellata					
Monte Redondo, Costa Rica	1.2	17	26.8	54.8	25.8
Costa Rica	1.3	17.9	27.7	57.9	27
Colombia	1.3	18.2	28.3	62	30.6

The present species shows decided size variation and also frequent pronotal asymmetry.

[133] Bruner has recorded that species from the island of Ometépe, Nicaragua, and has given an excellent figure of the insect (Nat. Hist. Bull., Lab. Nat. Hist. State Univ. Iowa, iii, p. 60, pl. ii, fig. 1, (1895)).

Blaberus colosseus (Illiger)

1802. *Blatta colossea* Illiger, Mag. Insektenkunde, i, p. 186. [Demerara (= British Guiana).]

1916. *Blaberus colosseus* Hebard, Ent. News, xxvii, p. 291, pl. xv, figs. 2 to 5. [♂, ♀; localities in Mexico, Guatemala, Costa Rica, Panama, Venezuela, Trinidad and French Guiana.]

Alhajuela, Panama, III, 10, 1912, (Busck), 1 ♂, 1 ♀, 1 small juv.
Gorgona, Canal Zone, Pan., 1 ♂, [Academy of Natural Sciences of Philadelphia].
Paraiso, C. Z., Pan., IV, 4, 1912, (Busck), 1 juv. ♂, 1 small juv.
Cabima, Pan., V, 18, 1911, (Busck), 1 ♂, 1 ♀ with ootheca.
Ancon, C. Z., Pan., 1 ♂, [United States National Museum].
Chorrera, Pan., V, 17, 1912, (Busck), 1 ♀.
Bugaba, Chiriqui, Panama, (Wm. Schaus), 1 juv. ♂.

This is the largest Central American species of the genus, the tegmina in females of the present series measure sixty-six to seventy millimeters in length. The insect is a beautiful immaculate pale buffy brown, with shield-shaped area on disk of pronotum, humeral trunk and a broad transverse band mesad between the humeral veins of the tegmina when these are at rest, dark brown.

The ootheca is simply a mantle, holding a double row of eggs in place in a strip, in the specimen before us eight millimeters in width and extruded a distance of approximately twenty-four millimeters.

The immature condition of this species is distinctly patelliform (see footnote 130, on page 109), with pronotum and lateral portions of abdominal segments exceedingly lamellate, when compared with immature examples of other species of the genus *Blaberus*.

Blaberus discoidalis Serville

1839. *Blabera discoidalis* Serville, Hist. Nat. Ins., Orth., p. 76. [♀, San Domingo.]

1889. *Blabera limbata* Bruner (not of Burmeister, 1838), Proc. U. S. Nat. Mus., xii, p. 188. [adult, Panama.]

1896. *B[labera] trapezoidea* Griffini (not of Burmeister, 1838), Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 4. [♀; Punta di Sabana, Darien.]

1896. *B[labera] rufescens* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 4. [♀; Lake Pita, Darien.]

1916. *Blaberus discoidalis* Hebard, Ent. News, xxvii, p. 294. [Detailed diagnosis: ♂, ♀: San Domingo, Porto Rico, Jamaica, Trinidad, Venezuela and Panama.]

Pinogana, Darien, Panama, XII, 1915, (Muñoz), 1 ♀, 1 juv. ♂, [Hebard Collection].

Porto Bello, Pan., (Jennings), 1 ♂.

Rio Trinidad, Pan., VI, 4, 1912, (Busck), 1 juv. ♂, 1 juv. ♀.

Gatun, Canal Zone, Pan., VII, 28 to VIII, 22, 1916, (Harrower; near habitations, under boards), 2 juv. ♂, 3 juv. ♀, 1 small juv.

Ancon, C. Z., Pan., (Jennings), 22 small juv.

Taboga Island, Pan., VI, 4, 1912, (Busck), 1 juv. ♀.

This species is readily distinguished from the preceding by its decidedly smaller size, somewhat broader form and darker buffy brown general coloration. The tegmina are seldom much suffused beyond the apex of the humeral trunk, though sometimes heavily so, but a broad transverse median band, such as is found in *colosseus*, never occurs.

The immature condition of this species is more convex and has the pronotum and lateral portions of the dorsal surface much less lamellate than in immatures of *colosseus*, in general form very similar to immature examples of the genus *Archimandrita*.

EUBLABERUS new genus

1894. *Blabera* Saussure and Zehntner, Biol. Cent. Am., Orth., i, p. 117. (In part; species placed in section "*a*" of key for the genus.)

The present genus includes *biolleyi* (Rehn), *posticus* (Erichson), *sulzeri* (Guerin), *distanti* (Kirby), *femorata* (Scudder) and *immacula* (Saussure and Zehntner), which, in our opinion should be arranged in the order here indicated.

GENOTYPE: *Eublaberus biolleyi* [*Blaberus biolleyi*] (Rehn).[134]

The genus is closely related to *Blaberus*, but differs signally in a number of features, given in the following description, which give all of the species a distinctly different facies.

Generic Description.—Interocular space wide to very wide; wide only in certain species of *Blaberus*. Antennae heavy, incrassate, moderately pilose except in proximal portion; distinctly more slender in *Blaberus*, with pilose condition less decided. Pronotum with lateral margins showing an appreciable angulation mesad or meso-cephalad, or with point of greatest convexity meso-cephalad; in *Blaberus* the lateral margins of the pronotum never show any angulation, the point of greatest convexity being mesad or meso-caudad. Pronotum with a broad blackish bar on caudal margin.[135]

[134] We select this species as genotype, owing to the fact that both original description and figure are better than for any other species here included. See Proc. Acad. Nat. Sci., 1905, p. 792, fig. 1, (1906).

[135] Such marking is found only in *Blaberus fraternus* Saussure, among the species of that genus at hand.

Ventro-cephalic margin of cephalic femora supplied with a fringe of hairs, terminated by a single stout spine; occasional individuals show one or a few stout proximal spines on this margin; which is the normal condition in *Blaberus*. Ventro-caudal femoral margins supplied with hairs; ventro-caudal margin of cephalic and median femora armed, distad only, with two closely placed heavy spines;[136] in *Blaberus* these two distal spines are never found. Limbs proportionately somewhat shorter and stouter than in *Blaberus*.

Eublaberus biolleyi (Rehn)

1906. *Blaberus biolleyi* Rehn, Proc. Acad. Nat. Sci. Phila., 1905, p. 792, fig. 1. [♀; Reventazon River, plains of Santa Clara, Costa Rica.]

Cabima, Panama, V, 27, 1911, (Busck), 1 ♀.

The present specimen closely resembles the type. The pronotum is slightly more ample, the two pair of dots cephalad similar, the pair of median blotches and pair of caudal blotches narrowly fusing longitudinally with each other and with the broad caudal marginal black band. We would note that this marginal band is broadest mesad in the present species, narrowing toward the point above the humeral trunk of the tegmina on each side and very narrowly continued beyond. In *E. posticus* (Erichson) this band is nearly subequal in width throughout and is sharply obliquely terminated at the point above the humeral trunk of the tegmina on each side.

Eublaberus posticus (Erichson)

1848. *Blabera postica* Erichson, in Schomb. Reisen Brit. Guiana, iii, p. 580. [British Guiana.]

1894. *Blabera thoracica* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 120, pl. v, fig. 25. [♀: Panama; Bogotá, Colombia.]

1896. *B[labera] thoracica* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 5. [♀; Punta di Sabana, Darien.]

Panama, 1 ♀, [U. S. N. M.]

Gatun, Canal Zone, Pan., VII, 25 to VIII, 22, 1916, (Harrower; one in house), 2 ♀.

The present insect is distinctive in having, in the area of the lyrate pronotal escutcheon, a large number of small dark dots and blotches, rather than a few heavier markings, as found in *E. biolleyi* (Rehn), or a heavy suffusion such as occurs in the remaining species of the genus.

[136] Occasionally one or both of these spines are missing on one or more of these femora. Not a specimen at hand, however, fails to have at least two of the four femora supplied with these two distal spines, which occur in no other genus of the Blattidae known to us.

Decided variation occurs in the width of the interocular space and in size, as is shown by the following measurements (in millimeters) for the few Panamanian specimens at hand.

♀	Interocular width	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Panama	2.9	12.8	17.7	44.9	16.6
Gatun, Panama	2.6	11.1	16.1	38.8	15.1
Gatun, Panama	2.3	11.1	16.1	37.4	14.5

Subfamily CORYDIINAE

Holocompsa nitidula (Fabricius)

1781. *B[latta] nitidula* Fabricius, Spec. Ins., i, p. 345. [[♀], Surinam.]

1917. *Holocompsa nitidula* Hebard, Mem. Am. Ent. Soc., 2, p. 206, pl. viii, figs. 8 to 11. (Detailed diagnosis.)

Ancon, Canal Zone, Panama, (Jennings), 1 ♂.

The male sex of this minute species has the pronotum black, with a weak green-blue sheen, the female having the pronotum mars yellow to orange rufous.

The present specimen is decidedly smaller than a series of other males of the species before us. Length of body, 4; length of pronotum, 1.2; width of pronotum, 1.8; length of tegmen, 3.9 mm. In other respects it shows no variation from the normal.[137]

Holocompsa panamae new species (Plate VI, figure 4.)

The present species has the tegmina immaculate, the pronotum pale laterad, dark mesad, the median band expanding caudad to the caudal margin, instead of narrowing and failing to reach the caudal margin as in *H. zapoteca* Saussure and Zehntner, which is the only other known species of the genus having the pronotum bicolored. In size *panamae* is smaller than any of the known species, the type female being smaller than the average male of *H. nitidula* (Fabricius).

Type.— ♀; Paraiso, Canal Zone, Panama. February 7, 1911. (A. Busck.) [United States National Museum.]

Size very small, form stout, tegmina and wings projecting only slightly beyond apex of abdomen. Head fully as broad as long; eyes very widely separated, above not extending inward beyond antennal bases; ocelli minute, oval, with surface convex; occiput and face supplied with very minute and moderately numerous hairs.

[137] We regret to state that, in the detailed diagnosis referred to above, we failed to mention that, in males of this species, the hyaline distal portion of the tegmina shows, when the tegmina are at rest, a weak but broad transverse suffusion of brown.

Pronotum proportionately less ample and less transverse than in *nitidula;* well supplied with very minute hairs, these decidedly less numerous and not elongate on the cephalic and lateral margins as in *nitidula;* surface weakly convex, becoming strongly so laterad; cephalic and caudal margins transverse, lateral margins weakly divergent caudad and weakly convex; latero-cephalic angles very broadly rounded and very broadly obtuse-angulate, latero-caudal angles broadly rounded, forming an angle of slightly more than ninety degrees. Scutellum proportionately large, smooth, without hairs. Tegmina proximad opaque, smooth, without hairs, bounded by a straight oblique line from apex of scutellum to apex of discoidal vein; remaining distal portion delicate, suffused, hyaline.

Cerci as in *nitidula*, with (eight) strongly defined, rounded joints. Supra-anal plate decidedly produced, free margin rather strongly convex. Subgenital plate[138] with surface convex, deeply and sharply acute-angulate emarginate in mesal quarter, this area occupied by two valves, with surfaces weakly concave, separated by a medio-longitudinal cleft.

Cephalic femora with ventro-cephalic margin armed with a row of minute chaetiform spines, succeeded by two heavy, elongate, distal spines, of which the last is much the longer; other ventral femoral margins unarmed. Tarsi very slender; caudal metatarsus longer than combined length of succeeding joints, its ventral surface armed with a double row of microscopic chaetiform spines; minutely microscopic pulvilli appreciable only, situated distad on first and second joints, filling ventral surfaces of third and fourth joints. Moderately well developed arolia present.

Length of body, 5; length of pronotum, 1.4; width of pronotum, 1.7; length of tegmen, 4.65; width of tegmen, 1.8; length of caudal tibia, 1.8 mm.

Head blackish mummy brown. Antennae of same color, with a broad buffy annulus (which occupies four to six joints) meso-distad. Pronotum with a broad medio-longitudinal suffused band of blackish mummy brown, which expands evenly caudad, nearly twice as broad at the caudal margin as at the cephalic margin; pronotum laterad light ochraceous-buff, tinged with ochraceous-orange mesad toward the median band. Proximal opaque portion of tegmina blackish mummy brown, with a very feeble metallic purplish sheen; distal portions of tegmina hyaline, tinged with mummy brown. Ventral surface and limbs dark mummy brown, except proximal two-thirds of median and caudal femora, which are pale ochraceous-buff.

The type is unique.

Hypercompsa fieberi (Brunner)

1865. *Diaphana fieberi* Brunner, Nouv. Syst. Blatt., p. 439. [♂, Brazil.]

Porto Bello, Panama, II, 24, 1911, (Busck), 1 ♀.

This diminutive insect is remarkable in having the tegmina entirely clear hyaline, except for a narrow marginal area which expands slightly twice along the costal margin and a very narrow

[138] The remaining portions of this description give characters which are found in all the species of the genus *Holocompsa.*

marginal area bounding the sutural margin in the anal field, these areas opaque, blackish. The insect is blackish, with caudal margin of pronotum narrowly ochraceous-tawny, this expanding slightly toward the latero-caudal angles. The cerci and a broad meso-distal annulus on the antennae are ochraceous-buff.

Latindia dohrniana Saussure and Zehntner

1894. *Latindia dohrniana* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 111, pl. v, fig. 7. [♀, Guatemala.]

Rio Trinidad, Panama, V, 3, 1911, (Busck), 1 ♀.

Cabima, Pan., V, 24, 1911, (Busck), 1 ♀.

Both females here recorded have fully developed tegmina, extending well beyond the apex of the abdomen. A small series before us shows that tegminal reduction occurs in this species in both sexes, varying to the condition figured for the type, which shows the tegmina failing to reach the apex of the abdomen by almost the pronotal length.

The present minute brown species has the sexes similar; eyes very widely separated, the interocular width decidedly greater than that between the antennal sockets, eyes reduced and narrower in dorsal than in lateral portion; disk of pronotum flat, strongly truncate caudad, with a transverse broadly obtuse-angulate linear sulcus meso-cephalad, from the angle of which extends caudad a medio-longitudinal linear sulcus; tegmina with numerous, strongly oblique discoidal sectors, and cephalic and caudal femora of male enlarged, the cephalic femora with two large, heavy dentate projections on their ventro-caudal margins. In both sexes the ventro-cephalic margin of the cephalic femora is supplied with a fringe of microscopic hairs, of which all but the more proximal are very short. Both median and caudal femora are normally supplied with a minute and very delicate dorsal genicular spine.[139] Pulvilli and arolia absent. These features we consider of generic diagnostic value.

Compsodes cucullatus (Saussure and Zehntner)

1894. *Latindia cucullata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 111, pl. v, fig. 9. [♂; San Geronimo, Guatemala.]

Corozal, Canal Zone, Panama, IV, 14, 1912, (Busck), 1 ♂.

[139] Two specimens, in the small series before us, have one limb showing no trace of this spine.

This minute brown roach is the only species of the genus [140] in which the pronotum is produced cephalad, extending beyond the head.

MELESTORA Stål

1858. *Melestora* Stål, Kongl. Svenska Freg. Eugenies Resa, Zool., i, p. 311.

The present genus is distinctly closer to *Compsodes* Hebard than to *Latindia* Stål, as is shown by the large and fully developed eyes, form of pronotum and character of tegminal venation.

From *Compsodes* we would note that the males of *Melestora*[141] are best distinguished by the more slender form; wide interocular space;[142] pronotum lacking medio-longitudinal linear sulcation; tegmina with discoidal sectors very weakly oblique beyond apex of anal field, elsewhere longitudinal,[143] cross-veinlets very weak or subobsolete proximad and obsolete distad; subgenital plate strongly asymmetrical, and arolia though very small relatively well developed, extending from half as far toward to nearly to the apices of the tarsal claws.

Melestora micra new species (Plate VI, figure 5.)

The present minute, uniformly colored species, with *M. minutissima* Rehn, is readily distinguished from the three other previously known South American species of the genus by the much smaller size and slender form.

The very close relationship to *minutissima* is shown by the fact that the two species agree in every respect, except in genitalic features.

Type.— ♂; Paraiso, Canal Zone, Panama. May 10, 1911. (A. H. Jennings.) [United States National Museum.]

Size minute; form elongate ovate, depressed surface polished, regularly but not thickly clothed with silky pile.[144] Head visible cephalad of pronotum; occiput

[140] Described; Trans. Am. Ent. Soc., 2, p. 208, (1917).

[141] The female sex is unknown for *Melestora*. In *Latindia* females are generally similar to males, in *Compsodes* they lack organs of flight and retain the immature form.

[142] Not, however, accompanied by ocular reduction or as wide as in *Latindia*.

[143] Stål's figure for the genotype, *M. adspersipennis* Stål, shows these sectors moderately oblique, though termed longitudinal veins in his original description. This disparity is probably due to the discoidal sectors being in that species as characterized above, which condition is shown by the several other species of *Melestora* before us.

[144] On the pronotum and proximal portions of the tegmina, this pile has been rubbed off in the two specimens at hand. The sockets from which the hairs spring are, however, there clearly visible under high magnification.

convex, interocular space broad, appreciably greater than that between the antennal sockets, subequal to occipital depth of the very large eyes. Surface of interocular area with regularly placed impressed pits, connected by fine radiating lines, this weakening to area above labrum, which is smooth and polished. Maxillary palpi with fifth (distal) joint enlarged, as long as combined length of second and third joints, third joint slightly longer than fourth.

Pronotum transverse, short elliptical; margins convex, the greatest convexity being at the weakly suggested latero-caudal angles; surface weakly convex laterad, lateral-caudal sulci of disk represented by broad and rather shallowly depressed areas diverging cephalad, the intervening section very feebly convex, with very weak transverse wrinkles and no trace of a medio-longitudinal sulcation. Tegmina coriaceous, lanceolate-elliptical; width greatest meso-distad; apex rather broadly rounded; costal margin finely nodulose cingulate from distal portion of marginal field to apex; anal field elongate pyriform, anal sulcus distinct; discoidal sectors (four or five) longitudinal, except immediately beyond apex of anal field where one or two are weakly oblique, connected by moderately well developed cross-veinlets, which form irregularly rectangulate interspaces, the majority of which are elongate, particularly distad.[145] Wings fully developed.

Supra-anal plate transverse, free margin broadly and evenly convex. Paired plate beneath supra-anal plate with sinistral portion slightly the heavier, supplied with a few stiff microscopic hairs. Subgenital plate highly asymmetrical: margin sinistrad sharply and strongly obliquely concave ventrad of cercus, this concavity rather extensively subchitinous at its base, forming a socket from which springs a minute, microscopic, simple style;[146] mesad the plate is produced in a lamella with disto-sinistral angle broadly rounded, while the disto-dextral angle is produced dextrad in a heavy arm, which at its apex is sharply curved back, thence forming a slender chitinous process lying along the dorsal margin of the produced portion, with apex aciculate; dextrad the margin is feebly convex, oblique produced to the median produced portion, from which it is separated by a straight sulcus, which is subchitinous, showing a weak inclination sinistrad, and runs to near the proximal third of the plate.

Cephalic femora missing. Median and caudal femora with ventral margins well supplied with spiniform hairs.[147] Dorsal genicular spines absent from all limbs. Caudal tarsus about four-fifths as long as caudal tibia; the metatarsus slightly longer than the combined length of the succeeding tarsal joints, pilose, with ventral

[145] The tegmina in the specimens here considered have lost most of the pilose covering shown by the type of *minutissima*, and the venation is consequently more readily observed. These species do not show any differences in tegminal venation which we would consider of specific diagnostic value.

[146] In the type of *minutissima*, a homologous, minute, microscopic, simple, sinistral style is found.

[147] This is not a condition which we would term "finely spined," as given for *minutissima* by Rehn, in which species the limbs are in every way similar. This type of limb we would unhesitatingly place in the unarmed category.

surface unspined. Pulvilli absent. Arolia moderately large, extending to near apices of tarsal claws, as is true for *minutissima*.

Measurements (in millimeters)

♂	Length of body[148]	Length of pronotum[149]	Width of pronotum	Length of tegmen	Width of tegmen
Paraiso, *type*.....	4.4	1.2	1.7	5	1.8
Paraiso, *paratype*.....	4.8	1.2	1.7	5.2	1.8

The coloration shows no specific diagnostic features of difference from that of *minutissima*. General color mummy brown; mouthparts, limbs and underparts buckthorn brown, except abdomen distad which is mummy brown. Antennae mummy brown proximad, shading to buckthorn brown distad. Tegmina translucent, prout's brown. Cerci buckthorn brown tinged with tawny.

In addition to the type, a paratypic male bearing the same data, but taken May 3, 1911, by E. A. Schwarz, is at hand.

BUBOBLATTA[150] new genus

The present genus has both sexes showing fully developed and very broad organs of flight. It is very distinctive, but apparently nearest *Melestora* of the described genera; differing in the presence of ocelli, maxillary palpi with elongate third and fourth joints, very broad tegmina with decided ridges between all of the veins, excepting those of the anal field, and distinctive armament of the limbs.

The genus is monotypic. GENOTYPE: *Buboblatta armata* [*Latindia armata*] (Caudell).

Generic Description.—Size large when compared with the species of the related genera, form relatively broad, surface well supplied with stiff microscopic hairs. Head not entirely concealed from above by pronotum; interocular space somewhat flattened, the greatest convexity and projection being between the distinct but minute ocelli. Third and fourth joints of maxillary palpi elongate, decidedly longer than the fifth (distal) joint. Antennae much longer than body.

[148] The greater length of the type of *minutissima*, 6.2 mm., is entirely due to the fact that that specimen is somewhat pressed out.

[149] We find no noteworthy difference for *minutissima* in pronotal proportions, the pronotum in the type of that species being 1.3 by 1.8 mm., according to our measurement.

[150] From *Bubo*, the generic name of the Great Horned and Eagle Owls. In allusion to the mottled owl-like appearance of the species referred to this genus.

Pronotum subdeplanate, except laterad where it is weakly deflexed, disk slightly impressed with broad and shallow latero-caudal sulci appreciable; cephalic margin almost transverse, caudal margin very weakly convex. Tegmina very broad, with decided ridges between all of the veins except those of the anal field, discoidal sectors longitudinal; anal sulcus distinct; oblique sulcus of dextral tegmen decided.

Male subgenital plate weakly asymmetrical. Female subgenital plate valvular, the valves vertical, with proximal sulcus transverse.

Cephalic femora with ventro-cephalic margin armed with (three) widely separated, moderately heavy spines, succeeded by a row of closely placed, microscopic, piliform spines, terminated by three moderately heavy spines, elongate in strongly increasing ratio distad. Ventro-caudal margin of cephalic femora armed with a single distal spine, other ventro-caudal femoral margins unarmed, but all supplied with well spaced, moderately elongate hairs. Ventro-cephalic margins of median and caudal femora supplied with small hairs and armed with (two and one distal) moderately heavy, elongate spines. Median and caudal femora armed with a moderately heavy, elongate, dorsal genicular spine. Caudal tarsi very elongate, nearly as long as caudal tibia. Caudal metatarsus decidedly longer than combined length of succeeding joints, pilose, with ventral surface unarmed. Pulvilli absent. Minute arolia present.

Buboblatta armata (Caudell) (Plate VI, figures 6 to 8.)

1914. *Latindia armata* Caudell, Insec. Inscit. Menst., ii, p. 80. [♂; Gatun, Canal Zone, Panama.]

Porto Bello, Panama, VIII, 18 to 22, 1916, (Harrower), 2♂, 1 ♀.

Gatun, Canal Zone, Pan., (Jennings; in bromeliad), 1 ♂, *type*; VII, 25 to 31, 1916, (Harrower), 1 ♂.

This insect is easily one of the most distinctive of the American Corydids hitherto described. It is brussels brown in general coloration, delicately mottled with mummy brown, with a fleck of this darker color mesad on each side at the caudal margin of the pronotum, one proximad in the anal field at the sutural margin of the tegmina, and a more conspicuous fleck of this color meso-proximad in the discoidal field of the tegmina. The antennae, which are much longer than the body, are mummy brown distad, ochraceous-buff with an orange tinge in the proximal third, except

the first two joints which are blackish chestnut brown. The minute globose ocelli are yellowish.

The higherto unknown female differs from the male in the following features. Size larger, form broader, Head with interocular space distinctly broader, slightly greater than the proportionately greater space between the antennal sockets. Pronotum more ample. Tegmina reaching beyond the abdomen a distance about equal to one-third their length (in the male reaching beyond the abdomen a distance equal to half their length). Supra-anal plate very strongly transverse, length about one-eighth proximal width, free margin broadly convex laterad, broadly concave mesad. Subgenital plate valvular, valves vertical, each subrectangulate, with length slightly over half basal width, dorso-distal and ventro-distal angles broadly rounded and the free margins all very feebly convex, basal sulcus transverse, straight, but surface of plate at that point strongly convex.[151]

As the male genitalia were injured in the type, we would note the following features. Supra-anal plate very strongly transverse, length less than one-eighth basal width, free margin strongly oblique laterad, transverse in median section, the angles thus formed very broadly obtuse-angulate and rounded. Subgenital plate appreciably more produced dextrad than sinistrad, supplied with two simple, straight styles, which are about six times as long as wide mesad; free margin strongly oblique to sinistral style, thence less strongly oblique to before base of dextral style, there rounding broadly into the feebly oblique, straight dextral margin.

Subfamily OXYHALOINAE

Key to the known Panamanian species of Chorisoneura[152]

A. Size relatively large (length of tegmen, 10 mm. or more). (Occiput reddish brown, interocular area whitish with two pairs of dark brown dots. Median portion of male subgenital plate, between bases of styles, with an elongate process, armed at apex with two slender spiniform teeth, which curve toward each other.)
panamae new species

[151] This rather suggests the type normal for the Blattinae. In that subfamily, however, we know of no species in which the valves themselves are as highly specialized.

[152] This key is furnished merely as an aid in locating Panamanian material. The multitude of species and numerous difficult, though valuable, characters of specific diagnostic importance require a much more detailed study.

AA. Size relatively small (length of tegmen, 8 mm. or less).

B. Occiput and interocular area plain.

C. Form Anaplectoid, tegmina narrow. Color very dark brown, area of costal veins of tegmina immaculate dark brown. Male subgenital plate produced sinistrad in a small rounded projection, median portion between bases of styles with a single very small recurved tooth.....**parishi** Rehn

CC. Form normal, Chorisoneuroid, tegmina moderately broad. Color dull ochraceous-orange; area of costal veins of tegmina dark brown, with clubbed portion whitish. Male subgenital plate not produced sinistrad, median portion between bases of styles unarmed.....**fuscipennis** new species

BB. Striking interocular markings present.

C. Pronotum not conspicuously marked. Tegmina with scapular field of moderate width. Wings with area of radial veins of same color as other portions.

D. Head with two narrow transverse whitish interocular bands, separated by a dark brown band of equal width. Male styles tapering distad to acute apex. Median portion of male subgenital plate, between bases of styles, with two minute decurved teeth at base of dextral style.

translucida (Saussure)

DD. Head with a single broad dark brown interocular band. Male styles of approximately equal width to truncate apex, which has a minute median projection. Median portion of male subgenital plate, between bases of styles, minutely triangularly produced, unarmed.....**cabimae** new species

CC. Pronotum conspicuously marked. Tegmina with scapular field very broad. Wings with area of radial veins of different color from other portions.

D. Head with two narrow transverse buffy interocular bands, separated by a pale brown band of same color as occiput and face. Pronotum with narrow whitish marginal bands cephalad and caudad of equal width, disk immaculate. Median portion of male subgenital plate, between bases of styles, with an elongate process armed with (six) slender spiniform teeth.

specilliger new species

DD. Head with a broad transverse cream-colored interocular band dorsad, separated from a narrow band of the same color by a narrow dark brown band; occiput brown; face with a large subquadrate blackish brown area. Pronotum with marginal bands of unequal width, the cephalic band the wider; disk with two pale yellowish areas meso-caudad...**gemmicula** new species

Chorisoneura parishi Rehn

1918. *Chorisoneura parishi* Rehn, Proc. Acad. Nat. Sci. Phila., 1918, p. 163, pl. i, figs. 19 to 21. [♂; Igarapé-Assú, Pará, Brazil.]

Gatun, Canal Zone, Panama, VI, 1915, (Harrower), 1 juv. ♂.

Rio Trinidad, Pan., V, 2 to VI, 3, 1911 and 1912, (Busck), 1 ♂, 2 ♀, 1 juv. ♀.

Tabernilla, C. Z., Pan., V, 1907, (Busck), 1 ♀.

Zone limit, five miles west of Empire, C. Z., Pan., XI, 14, 1913, (Hebard; from jungle undergrowth), 1 ♀.

Old Panama, Pan., I, 31, 1911, (Schwarz), 1 ♀.

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; beaten from flowering weeds on edge of jungle), 1 ♂, 1 ♀.

Ancon, C. Z., Pan., (Jennings; from bush), 2 ♀.

This remarkable species has recently been thoroughly described for the male sex by Rehn.[153] It represents a distinctive and aberrant unit of the genus, which we would term the Parishi Group.

The female sex closely resembles the male, differing in having the tegmina slightly shorter, the interocular space very slightly wider, very slightly greater than that between the antennal sockets, the supra-anal plate more distinctly and sharply bilobate distad and subgenital plate of considerable lateral length, with a decided medio-longitudinal cleft distad.

All of the specimens here recorded are of a more intensive coloration than the two originally described Brazilian examples, the head with face blackish chestnut brown, shading to a paler brown on the occiput. In the two palest examples the head is ochraceous-tawny, tinged with chestnut brown only above the clypeal suture.

In the immature condition, the pair of lateral, poorly defined dark pronotal bars are continued on the mesonotum and metanotum, and as a narrow suffusion margining the entire dorsal surface of the abdomen; the four proximal dorsal abdominal segments, in addition, each have a few microscopic dots of dark brown along the caudal margin.

Chorisoneura panamae new species (Plate VI, figures 9 and 10.)

The present species is a member of what we term the Pellucida

[153] The ventral femoral margins, in our opinion, are supplied, characteristically, with a few hairs, rather than "supplied with a few weak, short spines." The male supra-anal plate is about one-third as long as its basal width, with apex broadly truncate and subbilobate.

Group.[154] It is closely related to *C. pellucida* Saussure,[155] agreeing closely in size, form and general coloration, but differs in the following respects: head with occiput dark, interocular-ocellar area whitish, with a pair of approximate dark brown dots and a smaller pair of more widely separated dots; pronotum with two short, longitudinally parallel, pale lines; much less transverse male supra-anal plate, and male subgenital plate with styles and intervening process distinctive.

Close relationship to *C. lata* Rehn, recently described from Pará, Brazil, is also shown. Comparison with the type of that species shows close agreement in size, form, general coloration and pronotal marking, that insect differing, however, in the following features: head immaculate[156] with two widely separated dark dots in the interocular-ocellar area; narrower pellucid border of tegmina; male subgenital plate with styles less elongate, broader and more truncate distad, the interval between their bases showing no mesal production whatever, but only two minutely microscopic decurved teeth.

In *C. tessellata* Rehn, from Ceará Mirim, Brazil, in addition to the distinctive coloration, we would note that the styles are of the type found in *pellucida*, but that the minute triangular production between their bases, though similar in form, is in *tessellata* surmounted by a single minute, but heavy, decurved tooth.

[154] This group includes a number of relatively large, broad species, all of which show marked specialization of the area between the styles of the male subgenital plate. In the collections at hand the following species belong to this group; *lata* Rehn, *panamae* here described, *pellucida* Saussure and *tessellata* Rehn. The two latter species show greater specialization of the male styles, these having their apices inwardly produced and overlapping, while the shafts of the styles are parallel in normal position and do not diverge.

Specimens at hand, recorded by Rehn as *C. minuta* Saussure and *C. perlucida* (Walker), represent a closely allied group, agreeing in general size and form, but having the greatest male genitalic specialization on the internal margin of the sinistral style, near its base, and showing no specialization of the median area between the bases of the styles.

[155] Saussure's original description of *pellucida*, from a Mexican female, is excellently supplemented by his later treatment of the species, from both sexes, taken near Moyoapan, Mexico (Hist. Nat. Mex., Rech. Zool., vi, p. 92, pl. ii, figs. 49 and 49a, (1870)). His color figure is excellent, except that the general coloration should apparently have a decidedly more orange tinge. Our comparisons here are supplemented by examination of a male of *pellucida* from San Rafael, Vera Cruz, Mexico, in the Hebard Collection.

[156] The type, however, has the head decidedly discolored. The species may be found to have the interocular-ocellar area pale, as in *panamae*.

Type.—♂; Porto Bello, Panama. April 17, 1912. (A. Busck.) [United States National Museum.]

Size large for the genus; form depressed, in outline elongate elliptico-ovoid. Head broad, decidedly depressed; from the dorsum practically the entire occiput and cephalic half of the eyes are seen to be exposed, occipital outline truncate, the eyes almost imperceptibly projecting beyond the interocular area; interocular space broad, one and one-half times occipital ocular depth, about four-fifths as wide as space between antennal sockets. Antennae nearly one and one-half times as long as body. Maxillary palpi with third joint elongate and slender; fourth joint three-quarters as long as third; fifth joint subequal in length to fourth, moderately enlarged.

Pronotum transverse elliptical, with a rectangulate tendency, due to the wide and strongly transverse cephalic and caudal margins, cephalic margin showing a trace of convexity only above head, caudal margin showing a very feeble convexity, lateral margins broadly convex, rounding evenly into cephalic and caudal margins; greatest width of pronotum mesad; disk with a shallow medio-longitudinal impression and a pair of brief oblique sulci laterad, lateral portions weakly declivent cephalad, where the surfaces are very shallowly concave, weakly bossed over the tegminal bases. Tegmina elongate, extending briefly beyond cercal apices, greatest width at proximal third, thence narrowing evenly to near the sharply rounded but acute apex; marginal field very broad; discoidal vein with (sixteen) branches, between which are a number of well developed false nervures, discoidal sectors (fifteen, counting all branches) strongly oblique.[167] Wings with a considerable intercalated triangle, acute-angulate proximad; (fourteen) costal veins (with nine) heavily and briefly clubbed distad, the more distal with clubbed portion more elongate and slender; discoidal and median veins connected by (ten) distinct cross-veinlets; ulnar vein branching near extremity and sending another branch to the margin of the intercalated triangle; axillary vein branching twice; the distal branch bifurcate.

Sixth dorsal abdominal segment with a large but not strongly concave area mesad, the margins of which are feebly raised latero-cephalad, convex, the depression containing a moderate number of agglutinated hairs, closely pressed upon its surface. Supra-anal plate nearly one-third as long as basal width, triangular, with apex broadly truncate and lateral margins very feebly concave, convergent. Cerci elongate, depressed, fusiform, very slender distad, tapering to acute apices. Subgenital plate with sinistral margin short and straight to base of sinistral style, dextral margin longer and moderately concave to base of dextral style; styles situated in poorly defined sockets, very elongate, broad at bases, tapering to apices which are lamellate and rounded, this strongest externally, each supplied on its internal face just before the apex with a central patch of microscopic teeth; between the styles the median portion of the plate is produced in a slender chitinous shaft, approximately half the length of one of the styles, armed at its apex with two small,

[167] Five of the discoidal sectors spring from the discoidal instead of from the median vein distad; this is an amplification of the condition found in many other forms of *Chorisoneura*.

slender, chitinous teeth, which curve toward each other, thus giving this portion some resemblance to one of the smaller claws of a crab.

Ventro-cephalic margin of cephalic femora armed with a row of minute and somewhat irregular microscopic chaetiform spines, of which the more proximal are the longer, terminated by a single elongate distal spine. Other limb characters as given on page 132 for *C. fuscipennis*, there described.

Allotype.— ♀ ; Porto Bello, Panama. April 21, 1912. (A. Busck.) [United States National Museum.]

Agrees closely with type. Tegmina nearly as elongate. Interocular space wider, fully four-fifths as wide as space between antennal sockets. Supra-anal plate triangularly produced, strongly notched at apex, this rounded emarginate, deeper than wide, the two sharply rounded portions thus formed with surfaces moderately convex, lateral margins feebly concave. Subgenital plate ample, narrow distal portion reflexed, longitudinally cleft mesad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *type*.....	10	2.4	3.9	10.9	3.4
Rio Trinidad, *paratype*....	10.1	2.4	3.9	10.3	3.2
Rio Trinidad, *paratype*....	10	2.4	3.9	10.7	3.4
♀					
Porto Bello, *allotype*.....	10.7	2.4	3.9	9.9	3.2

Head with vertex tawny to narrowest point between eyes, where this color is in abrupt contrast with the warm buff interocular-ocellar area. In this intersection are two conspicuous dots of dark chestnut brown, equally distant from each other and from the eyes, while just below these in the buffy area are two smaller and much more widely separated dots of the same color near the margins of the eyes; remaining portions of face warm buff washed with ochraceous-tawny. Pronotum with hexagonal disk ochraceous-orange tinged with tawny, very narrowly margined with whitish, with two medio-longitudinal parallel lines of light buff, which in length are slightly less than one-half that of the disk,[158] lateral portions transparent, very faintly tinged with buckthorn brown. Remaining portions of dorsal surface ochraceous-buff strongly washed with ochraceous-orange, a conspicuous dot of light buff mesad on the moderately large, exposed scutellum. Tegmina transparent, marginal and external two-thirds of scapular field immaculate, faintly tinged with buff, remaining portions with veins and veinlets transparent, faintly tinged with buff, the intervening areas tinged with ochraceous-orange.[159] Wings transparent, washed with ochraceous-orange, this decided in area of costal veins and distad in anterior and radial fields. Ventral surface ochraceous-buff washed with ochraceous-

[158] Minute flecks of light buff, latero-cephalad of and adjacent to these lines are found, subobsolete or distinctly indicated, in the series at hand.

[159] This pencilling as in *pellucida*, stronger than in *lata*, much less conspicuous than in *tessellata*.

orange. Limbs light ochraceous-buff, the spines and tarsal claws faintly tinged with ochraceous-orange.

In addition, two male paratypes, taken on the Rio Trinidad, Panama, by A. Busck, March 17 and June 3, 1912, are before us.

Chorisoneura fuscipennis new species (Plate VI, figure 11.)

The present species is closely related to *C. flavipennis* Saussure and Zehntner,[160] with which it agrees in general size, reddish general coloration and immaculate head. The present species is distinguished by the color of the tegmina, which are less suffused and not as tawny; dark wings, with area of clubbed portions of costal veins buffy; male subgenital plate having the styles more elongate and slender, and in the female by a slight, but distinctly less, reduction in the organs of flight.

These two species form a unit in the genus, which we would call the Flavipennis Group.

As in *flavipennis*, examples showing intensive coloration have the humeral trunk strongly darkened, but, unlike that species, the pronotum then has the caudal margin very narrowly whitish.

Type.—♂; Porto Bello, Panama. February 24, 1911. (A. Busck.) [United States National Museum.]

Size large for the small species of the genus; form depressed; surface glabrous. Head with occiput largely exposed cephalad of pronotum; interocular space slightly less than one and one-half times the occipital ocular depth, distinctly less than width between antennal sockets. Ocelli obsolete. Maxillary palpi with fourth joint three-fifths length of third, fifth (distal) joint slightly longer than fourth.

Pronotum transverse, subelliptical, greatest width very slightly caudad of mesal point; caudal margin transverse, very feebly convex, cephalic margin slightly more convex. Tegmina surpassing abdomen by more than pronotal length, elongate lanceolate; costal and sutural margins evenly and feebly convergent, straight from proximal third to distal portion of tegmina, where they are convex convergent to the moderately acute angulate, sharply rounded apex; marginal field narrow, reaching only slightly distad of apex of anal field; discoidal vein longitudinal, with (twelve to fifteen) straight costal branches and with (one to two) branches at apex toward sutural margin; discoidal sectors (five) oblique. Wings with appendicular field well developed, its length slightly less than width, basal outline forming very slightly more than a right angle; (eight to nine) costal veins briefly and heavily clubbed distad, discoidal and median veins connected by (seven to nine, and one or two incom-

[160] Described from Atoyac, Vera Cruz, Mexico. We have made the above comparisons from two males and two females from Guatemala and Costa Rica (three recorded by Rehn from Turrialba, Costa Rica).

plete) moderately heavy transverse veinlets, lesser veinlets distad connect the median, ulnar and anal veins, which veins curve distad toward the costal margin; axillary vein with two branches. Sixth dorsal abdominal segment with a large circular area mesad which is weakly concave, supplied with agglutinated hairs closely pressed against its surface.

Supra-anal plate with length about one-third proximal width, trigonal, lateral margins concave convergent to the moderately broad, rounded apex, which is supplied with a few setae. Cerci elongate fusiform, dorsal surface flattened, well supplied laterad and ventrad with elongate setae. Subgenital plate very small, brief lateral portions reflexed with free margins weakly concave, oblique to the two elongate styles, which are set deeply into sockets, between which the brief median portion of the plate is oblique, slightly the more produced dextrad; styles similar, straight, compressed cultriform, margins converging to acute apices, nearly four times as long as basal width, extending slightly beyond apex of supra-anal plate.

Ventro-cephalic margin of cephalic femora armed with a long row of minutely microscopic chaetiform spines, terminated by a single elongate distal spine, other ventral femoral margins unarmed except distad, supplied with a few moderately elongate hairs, both margins of median and caudal femora with a single elongate distal spine. Caudal metatarsus distinctly longer than combined length of succeeding joints. Fourth tarsal joint, alone, with ventral surface fully occupied by a pulvillus. Large arolia present between the asymmetrical tarsal claws.

Allotype.— ♀; Taboga Island, Panama. June 9, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with male. Tegmina slightly less elongate. Interocular space wider. Subgenital plate ample, with a meso-distal longitudinal cleft.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *type*	8.8[161]	2	2.9	7.8	2.6
Cabima, *paratype*	7.8	1.9	2.9	7.8	2.6
♀					
Taboga Island, *allotype*	7.8	2	2.9	7.6	2.7

In the type the length of the wing is 8.1; of appendicular field, 2.; width of appendicular field, 2.7 mm.

Head and dorsal surface of abdomen dull ochraceous-orange. Eyes blackish. Two proximal joints of antennae ochraceous-buff, succeeding joints blackish.[162] Disk of pronotum dull ochraceous-orange, lateral portions transparent, very faintly tinged with buckthorn brown, caudal margin very narrowly whitish. Tegmina transparent, tinged with buckthorn brown, the humeral trunk suffused with prout's brown to nearly as far distad as apex of anal field; area of dextral tegmen concealed when at rest, suffused with mummy brown in the type, as pale as the other

[161] Crushed, normal length probably about as in paratype.

[162] All but the proximal eighteen joints of the antennae are missing.

portions in the paratype. Wings transparent, iridescent, tinged with mummy brown, area of costal veins and distal areas toward appendicular field mummy brown in type, prout's brown in other specimens, except area of swollen portions of costal veins which is whitish; appendicular field heavily tinged with mummy brown in type, prout's brown in other specimens. Ventral surface pale ochraceous-tawny, with abdominal segments narrowly margined with ochraceous-buff. Limbs ochraceous-buff.

The allotype is clearly a recessive example and has the tegmina immaculate.

In addition to the type and allotype, we have before us a paratypic male, taken at Cabima, Panama, May 21, 1911, by A. Busck.

Chorisoneura translucida (Saussure) (Plate VI, figures 12 and 13.)

1864. *Bl[atta] translucida* Saussure, Rév. et Mag. de Zool., (2), xvi, p. 311. [[♀], Mexico.]

1870. *Chorisoneura translucida* Saussure, Miss. Sci. Mex., Rech. Zool., vi, p. 91. [More detailed diagnosis: ♂, ♀; Cordillera Oriental, Mexico.]

Tabernilla, Canal Zone, Panama, V, 10, 1907, (Busck), 1 ♂.

Gold Hill, C. Z., Pan., XI, 14, 1913, (Hebard; beaten from vines covering low bushes), 1 juv. ♀.

Paraiso, C. Z., Pan., I, 17 to V, 5, 1911, (Busck, Schwarz), 3 ♂, 2 ♀, 1 small juv. ♂, 2 very small juv.

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; in jungle vegetation), 1 juv. ♀.

The series of adults differs from the majority in a Mexican series before us, in having the tegmina more suffused with brown between the veins, except toward the costal margin. Some variation in this respect is, however, shown by the Mexican series.

The male sex has relatively short stout styles with interval between their bases relatively broad, the dextral style having beneath its base sinistrad a pair of microscopic decurved teeth. The margin of the subgenital plate appears to be somewhat irregular and subject to some individual variation.

Our recent remarks on this species[163] can not be supplemented until much larger series are secured.

The large immature examples before us are pale and immaculate ochraceous-tawny dorsad, except that the abdominal segments are marked with microscopic and rather distant flecks of ochraceous-tawny, while at the latero-caudal angles of the fifth segment are large blotches of mummy brown, the sixth segment being lined at that point along the caudal margin with the same color.

[163] Trans. Am. Ent. Soc., xlv, p. 119, (1919).

Chorisoneura cabimae new species (Plate VI, figures 14 and 15.)

Of the species of *Chorisoneura* before us, the present insect shows nearest relationship to *C. translucida* (Saussure). It differs in the distinctive interocular marking and male genitalia. The styles show the greatest truncation of any species of the genus at hand.

The tegmina have the veins and interspaces unicolorous, as in the majority of Mexican specimens of *translucida* before us, but unlike material from the more southern portions of the continent which we have assigned to that species.

Type.—♂; Cabima, Panama. May 19, 1911. (A. Busck.) [United States National Museum.]

Size medium for the small species of the genus; form depressed, surface glabrous. Head with occiput largely exposed. Interocular space about one and one-fourth times the occipital ocular depth, about two-thirds the width between the antennal sockets. Maxillary palpi with fifth joint enlarged and elongate, slightly longer than third, fourth about three-quarters as long as third joint.

Pronotum transverse, subelliptical; greatest width meso-caudad; cephalic and caudal margins transverse, feebly convex; latero-cephalic angles distinctly more broadly rounded than latero-caudal angles. Tegmina surpassing apex of abdomen by slightly more than pronotal length, strongly elongate lanceolate, narrower than in *C. specilliger* and *C. gemmicula* here described; costal and sutural margins evenly and feebly convergent, straight from proximal third to the sharply rounded apex, as in *translucida*, distinctly less acute than in *specilliger* and *gemmicula*; scapular field as in *translucida*, not as broad as in *specilliger* or *gemmicula;* discoidal vein longitudinal with (twelve to fourteen in series, of which two to five distal are subobsolete) costal branches which are almost straight; discoidal sectors (five to eight) oblique. Wings and venation very delicate; appendicular field nearly as long as broad, basal outline forming very slightly more than a right-angle; costal veins (seven to nine) moderately heavily clubbed distad, the clubs not as heavy as in *specilliger* or *gemmicula*, discoidal and median veins connected by (six to seven in series) very inconspicuous transverse veinlets, other transverse veinlets subobsolete. Dorsal surface of abdomen with sixth segment specialized, showing a relatively large but shallow, subcircular median depression, the caudal margin of which is somewhat raised and thickened, the depressed area containing a number of agglutinated hairs, closely pressed upon its surface and directed longitudinally.

Supra-anal plate triangularly produced, with sides feebly concave to the rather broadly rounded apex, length one-third basal width. Subgenital plate small, latero-caudal portions minutely produced and sharply rounded outside cercal bases, brief lateral portions of free margin thence nearly transverse, subconcave, to the large styles which are set in sockets; styles heavy, slightly over twice as long as broad, lamellate, with a weakly oblique row of microscopic teeth on interno-caudal face near apex, the apex itself broadly rounded, truncate, with a minute and sharply

rounded projection mesad; very brief portion of plate between bases of styles minutely triangularly produced, unspecialized, fitting tightly between bases of styles.

Cephalic femora with ventro-cephalic margin supplied with a long row of short, closely placed, microscopic piliform spines, terminated by a single elongate and moderately slender spine. Other ventral femoral margins unarmed except distad, but supplied with a few moderately elongate hairs, both margins of median and caudal femora with a single elongate, moderately slender distal spine. Median and caudal femora with an elongate, moderately slender, dorsal genicular spine. Caudal metatarsus very much longer than combined length of succeeding joints, supplied ventrad with a double row of widely spaced, microscopic chaetiform spines; fourth tarsal joint alone with ventral surface fully occupied by a pulvillus. Large arolia present between the asymmetrical tarsal claws.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cabima *type*	7.8	1.8	2.6	7.6	2.1
Cabima, *paratype*	8.2	1.8	2.5	7.3	2
Porto Bello, *paratype*	7.5	1.8	2.6	7.1	2

In the type the wing is 7.1 by 4.5; the appendicular field, 1.9 by 2 mm.

Head with vertex pale ochraceous-tawny, to a broad, blackish chestnut brown band between the eyes, face entirely buffy. Underparts and limbs ochraceous-buff, ventral surface of abdomen light buff. Pronotum with disk pale ochraceous-tawny, remaining portions transparent, very weakly tinged with buckthorn brown. Tegmina, including veins, transparent, weakly tinged with buckthorn brown, except narrowly along costal margin, where they are very weakly tinged with the same color. Wings transparent, with an exceedingly faint yellowish-brown tinge; in area of costal veins and distad in anterior and radial fields faintly tinged with ochraceous-buff. Dorsal surface of abdomen light buff, cerci light ochraceous-buff.

In the specimen from Porto Bello, intensification in coloration is shown. The face and abdomen is buckthorn brown, the disk of pronotum and vertex light cinnamon brown.[184]

In addition to the type, the following paratypes are at hand.

Porto Bello, Panama, II, 24, 1911, (Busck), 1 ♂.

Cabima, Pan., V, 26, 1911, (Busck), 1 ♂.

Chorisoneura specilliger[185] new species (Plate VI, figures 16 to 19.)

The present insect has the vertex showing two white bands, very similar to those found in *C. translucida* (Saussure), but the adjacent and intervening areas are all pale brown; the tegmina are broader, show distinctive features of venation and taper more evenly and decidedly distad from their point of greatest width.

[184] Possibly due to discoloration.

[185] The probe bearer.

The general coloration is richer and the male genitalia are distinctive, particularly in the type of specialization of the median portion of the subgenital plate.

In tegminal form and type of coloration closer similarity is shown to *C. gemmicula*, here described, under which species comparison is made, and to *C. albonervosa* Rehn, the much richer and more striking coloration, much fewer tegminal veins and differently specialized male subgenital plate readily distinguishing that species.

Type.—♂; Gatun, Canal Zone, Panama. July 28 to August 5, 1916. (D. E. Harrower.) [Hebard Collection, Type no, 497.]

In the features not mentioned here the present species agrees fully with *C. cabimae*, described on page 134. Size medium for the small species of the genus. Interocular space about one and one-third times the occipital ocular depth, two-thirds the width between the antennal sockets. Maxillary palpi with third joint slightly longer than fifth, the latter decidedly enlarged, fourth joint slightly shorter than fifth.

Pronotum transverse, nearly elliptical, greatest width almost mesad;[166] cephalic and caudal margins transverse, very feebly convex, cephalic angles more broadly rounded than caudal angles.

Tegmina surpassing abdomen by more than pronotal length, decidedly elongate lanceolate, costal and sutural margins evenly and feebly convergent, straight from proximal third to distal portion of tegmen, where they are convex convergent, the sutural margin over a greater distance, to the decidedly acute-angulate, very sharply rounded apex; scapular field broad, much broader than in *translucida;* discoidal vein longitudinal, with (thirteen to seventeen in series) costal branches, the more proximal of which (about seven) are distinctly arcuate, with or without a branch at apex toward sutural margin, discoidal and median veins much closer together than in *translucida;* discoidal sectors (eight to ten in series) oblique.

Wings of the general type found in the Pellucida Group, not as in the Translucida Group; with intercalated triangle rather than appendicular field relatively moderately well developed, its length approximately equal to its width, basal outline forming an angle distinctly less than a right-angle; (nine to twelve in series) costal veins briefly and heavily clubbed distad, discoidal and median veins connected by (seven) inconspicious transverse veinlets, other distal transverse veinlets between median, ulnar and anal veins extremely weak. Median depression of sixth dorsal abdominal segment shallow.

Supra-anal plate strongly transverse, length slightly over one-fifth proximal width, caudal margin broadly convex, showing weak indication of bilobation. Subgenital plate very small, brief lateral margins concave to the large styles which are deeply inset in sockets, the dextral the more so; styles elongate, length about three times basal width; trilamellate, tapering from large and briefly swollen base (this the more ample for the dextral style) to acute apex, which extends beyond the distal margin of the

[166] In *translucida* and *C. panamae* here described, with greatest width meso-caudad and latero-cephalic angles much more broadly rounded than latero-caudal angles.

supra-anal plate; very brief margin between styles rather sharply concave, from which springs, beneath the sinistral portion of the base of the dextral style, a slender chitinous shaft, slightly less than half as long as the style, bearing five slender elongate teeth, four along dextral margin directed disto-dextrad and one at apex directed distad.

Allotype.— ♀ ; Paraiso, Canal Zone, Panama. March 26, 1911. (A. Busck.) [United States National Museum.]

Agrees rather closely with male. Form slightly broader, tegmina distinctly shorter, only slightly surpassing cercal apices.[167] Interocular space broader, fully one and one-third times occipital ocular depth, three-quarters the width between the antennal sockets. Dorsal surface of abdomen not specialized. Supra-anal and subgenital plates as described for the female of *gemmicula.*

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *type*	7.7	1.9	2.8	7.9	2.6
Gatun, *paratype*	7.4	1.9	2.8	7.8	2.6
Porto Bello, *paratype*	6.8	1.8	2.7	7.8	2.3
Rio Trinidad, *paratype*	7.7	1.8	2.8	8	2.4
Juan Mina, *paratype*	6.8	1.8	2.7	7.2	2.4
♀					
Paraiso, *allotype*	6.7	1.8	2.7	7.1	2.4

Head dull ochraceous-orange, with two narrow bands of ochraceous-buff between the eyes, of equal width, separated by a slightly narrower interval of the general coloration, the lower band continued narrowly for a brief distance along the ventral margin of the eyes, as in *translucida.* Proximal antennal joint of general coloration washed with darker brown, succeeding joints in proximal third of antennae mummy brown, shading gradually to remaining portions which are ochraceous-buff. Pronotum with disk tawny, pronotum very narrowly margined for a brief distance meso-cephalad and along the entire caudal margin with whitish,[168] lateral portions transparent, very faintly tinged with buckthorn brown. Tegmina with marginal field and half of costal field toward costal margin transparent, very faintly tinged with buckthorn brown, remaining portions rather strongly tinged with buckthorn brown, the numerous veins very faintly tinged with that color, except the humeral trunk which is suffused with prout's brown. Wings transparent; radiate field to axillary vein tinged with mummy brown, remaining portions tinged with ochraceous-buff, approaching ochraceous-tawny in area of branches of axillary

[167] The small series shows that some variation in size and considerable variation in tegminal length occurs in the present species. In view of the fact that the two females of the closely related *gemmicula* show less tegminal reduction, we would expect to find females of the present species with tegmina of greater length, as well as the condition shown by the single female at hand.

[168] Thus showing nearest agreement with *albonervosa* in pronotal coloration.

vein, and in area of costal veins opaque, first ochraceous-tawny, then mummy brown, then in area of clubbed portions of veins buffy.[169] Dorsal surface of abdomen dull ochraceous-orange, cerci slightly paler. Ventral surface ochraceous-tawny, shading to ochraceous-buff on abdomen. Limbs ochraceous-buff tinged with orange.

The allotype and a paratypic male from Gatun show the maximum recessive coloration of the series; the head and disk of pronotum are ochraceous-tawny, the tegmina likewise paler. The distinctive occipital markings and character of tegminal coloration occur virtually unaltered. The brown of the radial field of the wings, however, does not contrast nearly as conspicuously with the more reddish remaining portions, nor is the clubbed area of the costal veins as conspicuously buffy.

In addition to the type and allotype, the following paratypic series is at hand.

Porto Bello, Panama, II, 19, 1911, (Schwarz), 1 ♂.
Gatun, Canal Zone, Pan., VII, 17 to 23, 1916, (Harrower), 1 ♂.
Rio Trinidad, Pan., V, 1, 1911, (Busck), 1 ♂.
Juan Mina Plantation, C. Z., Pan., VII, 13, 1918, (Dietz and Zetek; sweeping grass), 1 ♂, [U. S. N. M.].

Chorisoneura gemmicula new species (Plate VI, figures 20 to 22.)

The present insect is closely related to *C. specilliger*, described in the preceding pages. In addition to marked differences in the male genitalia, the present species differs in the much more distinctive cephalic and pronotal markings. In other features of coloration, however, these two species agree to an exceptional degree.

Type.—♂; Cabima, Panama. May 20, 1911. (A. Busck.) [United States National Museum.]

Size, interocular width, maxillary palpi, pronotum, tegmina (discoidal vein with fourteen to sixteen costal branches, with two or three branches at apex toward sutural margin; discoidal sectors eleven to twelve in series), wings (twelve costal veins, discoidal and median veins connected by eight inconspicuous transverse veinlets), supra-anal plate and character of limbs as in *specilliger*.

Subgenital plate rather small; lateral margins form small plates beneath cercal bases, thence these margins are brief to the styles, which are not as deeply inset in sockets as in *specilliger*; sinistral margin moderately convex from small subcercal production, the area contained by this convexity somewhat swollen; dextral margin oblique from base of small subcercal production; styles elongate, trilamellate, tapering from large base to distal three-fourths, where a shoulder occurs, the cephalic external portion thence produced, slender, to the sharply acute apex;

[169] This distinctive type of tegminal and wing coloration is duplicated in full in *gemmicula*. It does not occur in any other species of *Chorisoneura* known to us.

dextral style similar, but with externo-caudal proximal portion enlarged, forming a considerable lobe, which is seen to be concave on its cephalic face; margin between the styles brief, dextrad produced beneath the sinistral portion of the base of the dextral style, in a small, subquadrate plate, which bears on its distal margin two microscopic, decurved teeth.

Allotype.— ♀ ; Alhajuela, Panama. April 17, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with male. Form slightly broader, tegmina slightly shorter. Interocular space wider, one and three-quarters times as broad as the occipital ocular depth, about four-fifths as wide as space between antennal sockets. Dorsal surface of abdomen unspecialized. Supra-anal plate triangularly produced, apex moderately broadly cleft a distance twice the median width of this cleft,[170] lateral portions thus formed sharply rounded, each about three times as wide as the cleft at its median portion, surfaces convex. Subgenital plate scoop-shaped, with marginal convexity greatest latero-caudad, distal portion sharply reflexed, broad mesad with a medio-longitudinal cleft, this reflexed portion narrowing rather strongly to opposite cercal bases where it disappears.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cabima, *type*.....	8	1.8	2.8	8	2.7
Rio Trinidad, *paratype*.....	7.4	1.8	2.8	8	2.6
♀					
Alhajuela, *allotype*.....	7.1	2	2.8	7.8	2.6
Porto Bello.....	7.2	1.9	2.8	7.6	2.5

In the type the wing is 7.9 by 4.9; the intercalated triangle, 1.95 by 1.95 mm.

Head with vertex dull ochraceous-orange, a rather broad cream colored band between the eyes, below this with a very narrow band of blackish brown, below this a band of cream color of double the width of the dorsal band of this color, which laterad runs along the eyes to the ocellar areas, which are light ochraceous-buff; below this band the face is blackish brown in a large subquadrate area, the remaining portions light ochraceous-buff. Ventral surface ochraceous-tawny, shading to ochraceous-buff on abdomen. Limbs ochraceous-buff tinged with ochraceous-tawny. Pronotum with disk dull ochraceous-orange, with two large spots of light ochraceous-buff meso-caudad, the margins of which are poorly defined; pronotum rather broadly margined for a brief distance meso-cephalad and along the entire

[170] As the length of the supra-anal plate shows differences of specific diagnostic value in males of *Chorisoneura*, we believe that the degree of production of the female subgenital plate may prove to have some value as well. Slight differences in the character of the apical cleft, however, such as shown between *C. panamae*, here described, and the present species may be due to individual variation. We have already ascertained that, in *Ischnoptera*, the form of the apex of the female supra-anal plate is subject to decided variation in some of the species. In the present genus females hold the extruded ootheca firmly with margins fitting into the distal clefts of the supra-anal and subgenital plates.

caudal margin with whitish, as in *C. albonervosa* Rehn,[171] lateral portions transparent, very faintly tinged with buckthorn brown. Tegmina and wings colored as in *specilliger*. Dorsal surface of abdomen dull ochraceous-orange.

In addition to the type and allotype, a female is at hand, taken at Porto Bello, Panama, March 13, 1911, by A. Busck, and a paratypic male, taken on the Rio Trinidad, Panama, May 5, 1911, by A. Busck.

Subfamily PERISPHAERINAE

LITOPELTIS[172] new genus

The present genus belongs to the second section of the Perisphaerinae, containing *Stenopilema* Saussure and its allies. To this section also belong the American genera *Colapteroblatta*, *Poroblatta* and *Acroporoblatta*, recently described from Colombia by the author,[173] and *Mioblatta* Saussure, described from Brazil.[174] The present genus would superficially appear to be more closely related to *Mioblatta* than to the others, and represents a unit having a distinctly Panchlorine facies. Closer examination shows, however, that nearest relationship with *Colapteroblatta* exists, this indicated by the general similarity of tegminal and wing form and venation and limb armament.

From the original description of the male sex of *Mioblatta*, we find that males of *Litopeltis* differ in their larger size, somewhat broader form, lack of pubesence, smooth vertex without carinae, polished and not thickly microscopically impresso-punctate pronotum with cephalic margin showing feeble truncation, wings with proportionately narrower marginal field, ulnar vein with numerous incomplete branches and armed femora.

Compared with the male type of *Colapteroblatta compsa* Hebard, this sex of *Litopeltis* is found to differ in the decidedly smaller size, ocelli which are represented by poorly defined large ocellar spots, more convex pronotum with lateral wings strongly declivent and caudal margin more angulate and caudal metatarsus which is as long as the combined length of the succeeding tarsal joints. The females of these species differ similarly in size and in caudal meta-

[171] A further development of the type found in *specilliger*.

[172] From λιτή and πέλτη = smooth shield.

[173] Trans. Am. Ent. Soc., xlv, pp. 120 to 127, pl. xix, figs. 1 to 6, (1919).

[174] Rev. Suisse de Zool., iii, p. 56, pl. i, figs. 15 to 15c, (1895).

tarsal proportions, to a much less degree in form of pronotum, due to the more hooded type developed in this sex of *Colapteroblatta*, while in *Litopeltis* the tegmina are subquadrate.

GENOTYPE: *Litopeltis bispinosa* [*Calolampra bispinosa*] (Saussure).

Generic Description.—Size rather small for the group; form dissimilar in the sexes, male elongate, rather broad with dorsal surface of abdomen showing scarcely any convexity, female less elongate, broad, with dorsal surface of abdomen evenly convex. Surface of head and pronotum polished, microscopically and not thickly impresso-punctate. Interocular space of male broad, of female broader, in neither sex equal to width between antennal sockets. Ocelli represented by large, poorly defined spots in male; similar but smaller in female.

Pronotum with disk moderately convex, lateral wings strongly declivent, unspecialized; cephalic margin of pronotum showing weak truncation and caudal margin weakly obtuse-angulate produced with apex broadly rounded. Tegmina of male elongate, extending well beyond apex of abdomen; of female heavily chitinous, subquadrate, with sutural margins overlapping. Wings of male fully developed, of female small oval atrophied pads. Supra-anal plate of male very delicate, showing only a trace of bilobation; of female heavily chitinous with distal margin convex.

Limbs moderately heavy in male, very slightly more so in female. Ventro-cephalic margin of cephalic femora supplied with a fringe of chaetiform hairs, terminating distad in a single heavy, much reduced spine; ventro-caudal margin armed distad with (one[175] and one distal) heavy spines. Ventro-cephalic margin of median and caudal femora armed with (one or two and one distal) heavy, reduced spines. Ventro-caudal margin of median femora armed with (three or four, usually four, and one distal) heavy spines, of caudal femora with (three or four, usually three, and no distal) heavy spines. Four proximal tarsal joints with ventral surfaces unarmed, occupied by large pulvilli which are bluntly angulate produced distad, that of metatarsus linear in proximal portion. Moderate arolia present between the delicate tarsal claws.

[175] Very rarely this spine is absent.

Litopeltis bispinosa (Saussure) (Plate VI, figure 23.)

1893. [*Calolampra*] *bispinosa* Saussure, Societas Entomologicae, viii, p. 58. [♂, Nova Granada[176] (Colombia).]

1893. *Calolampra bispinosa* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 67, pl. iii, fig. 26. [♂ [nec ♀], Panama.]

1914. *Audreia marginata* Caudell, Insec. Inscit. Menst., ii, p. 77. [♀; Porto Bello, Panama.]

Porto Bello, Panama, (Jennings; in bromeliads), 1 ♀, *type* of *Audreia marginata* Caudell; II, 23 and 28, 1911, (Busck, Schwarz) 1 ♂, 1 juv. ♂.

Gatun, Canal Zone, Pan., VII, 25 to VIII, 22, 1916, (Harrower; from rotting banana stalks, at bases of leaves), 4 ♂, 8 ♀, 2 large juv. ♂, 4 large juv. ♀, 29 juv. ♂, 27 juv. ♀, 4 very small juv. ♂, 1 very small juv. ♀.

Alhajuela, Pan., IV, 4 and 6, 1911, (Busck), 1 juv. ♂, 1 very small juv. ♀.

Frijoles, Canal Zone, Pan., (Schwarz), 1 juv. ♂.

Buena Ventura, Pan., III, 10, 1911, (Busck), 1 juv. ♀.

Boquete, Pan., III, 1914, (Zetek), 1 ♂, [U. S. N. M.].

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; tunnelling in dead banana stalk), 3 large juv. ♀.

The type of *Audreia marginata* Caudell, now before us, when compared with the series at hand, shows beyond question the synonymy indicated above. A slight superficial resemblance is shown by females of this species to females of *Audreia carinulata* Saussure. Close observation, however, shows that these species are members of different subfamilies.

The slight triangular invasion of the dark coloration of the pronotal disk meso-cephalad, into the pale lateral wings, is a feature shown also by *Colapteroblatta compsa* Hebard and *Poroblatta cylindrica* Hebard.

[176] Probably including Panama, at that time part of Colombia. This is, in all likelihood, the same specimen subsequently considered by Saussure and Zehntner, recorded by them from Panama.

Explanation of Plates

Plate I

Map of the Canal Zone and vicinity, with localities indicated at which material studied in the present paper was taken.

Plate II

Fig. 1.—*Lissoblatta fulgida* (Saussure). Panama, Panama. Male. Dorsal view of tegmen. (×6)

Fig. 2.—*Lissoblatta fulgida* (Saussure). Porto Bello, Panama. Male. Distal outline of tarsal claws and arolium. (Greatly enlarged.) For difference between this genus and *Anaplecta*, compare figure 6.

Fig. 3.—*Anaplecta lateralis* Burmeister. Rio Trinidad, Panama. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 4.—*Anaplecta lateralis* Burmeister. Cabima, Panama. Female. Ventral view of subgenital plate. (Much enlarged.) Showing valvular type characteristic of this genus.

Fig. 5.—*Anaplecta asema* new species. Tabernilla, Canal Zone, Panama. Male. *Allotype*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 6.—*Anaplecta sordida* new species. Porto Bello, Panama. Female. *Type*. Distal outline of tarsal claws and arolium. (Greatly enlarged.) Type characteristic of this genus.

Fig. 7.—*Anaplecta gemma* new species. Porto Bello, Panama. Female. *Type*. Dorsal view of tegmen. (×6)

Fig. 8.—*Anaplecta hemiscotia* new species. Old Panama, Panama. Male. *Paratype*. Ventral view of subgenital plate. (Much enlarged.) From this angle the distal portion of the sinistral style is viewed obliquely.

Fig. 9.—*Anaplecta cabimae* new species. Cabima, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 10.—*Euthlastoblatta compsa* new species. Gatun, Canal Zone, Panama. Male. *Type*. Dorsal view of pronotum. (×7)

Fig. 11.—*Euthlastoblatta compsa* new species. Gatun, Canal Zone, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 12.—*Dendroblatta sobrina* Rehn. Rio Trinidad, Panama. Male. Dorsal view of pronotum. (×5.2). For difference between adult and immature color patterns, compare figure 13.

Fig. 13.—*Dendroblatta sobrina* Rehn. Rio Trinidad, Panama. Immature female. Dorsal view. (×5)

Fig. 14.—*Aglaopteryx lita* new species. Cabima, Panama. Female. *Type*. Dorsal view of pronotum. (×6.6)

Fig. 15.—*Aglaopteryx lita* new species. Cabima, Panama. Female. *Type*. Dorsal view of tegmen. (×5.2)

Fig. 16.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Dorsal view of pronotum. (×6.5)

Fig. 17.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Dorsal view of tegmen. (×3.5)

Fig. 18.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Lateral view of subgenital plate. (Much enlarged.) From this angle, the lateral view of the dextral style is obtained in this drawing.

Fig. 19.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Distal view of subgenital plate. (Much enlarged.) From this angle, the lateral view of the sinistral style, but the distal view of the dextral style, is obtained in this drawing.

Fig. 20.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Ventral view of subgenital plate. (Much enlarged.) From this angle, the dextral style can not be seen.

Fig. 21.—*Latiblattella inornata* new species. Rio Bejuco, Panama. Male. *Type.* Distal outline of tarsal claws and arolium. (Greatly enlarged.)

Fig. 22.—*Latiblattella angustifrons* new species. Porto Bello, Panama. Male. *Type.* Distal outline of tarsal claws and arolium. (Greatly enlarged.)

Fig. 23.—*Latiblattella angustifrons* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of styles and median process, apex of subgenital plate. (Greatly enlarged.) It is necessary to detach the subgenital plate in order to obtain this view.

Plate III

Fig. 1.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of pronotum. (×5.2)

Fig. 2.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of tegmen. (×2.5)

Fig. 3.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of wing. (×2.5)

Fig. 4.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 5.—*Chromatonotus heterus* new species. Chorrera, Panama. Female. *Type.* Dorsal view of pronotum. (×8.7)

Fig. 6.—*Chromatonotus lamprus* new species. Tabernilla, Canal Zone, Panama. Male. *Type.* Dorsal view of pronotum. (×9.1)

Fig. 7.—*Chromatonotus lamprus* new species. Tabernilla, Canal Zone, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 8.—*Rhytidometopum megalopterum* new species. Tabernilla, Canal Zone, Panama. Male. *Paratype.* Dorsal view of wing. (×3)

Fig. 9.—*Rhytidometopum megalopterum* new species. Rio Trinidad, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 10.—*Neoblattella acanthastylata* new species. Gatun, Canal Zone, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 11.—*Neoblattella acanthastylata* new species. Gatun, Canal Zone, Panama. Male. *Type*. Distal view of distal portion of subgenital plate, showing styles. (Greatly enlarged.)

Fig. 12.—*Neoblattella panamae* new species. Rio Trinidad, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 13.—*Neoblattella impar* new species. Alhajuela, Panama. Male. *Paratype*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 14.—*Neoblattella chagrensis* new species. Gatun, Canal Zone, Panama. Male. *Type*. Lateral view of distal portion of concealed sinistral process. (Greatly enlarged.) The basal line is the declivent sinistral margin of the subgenital plate.

Fig. 15.—*Neoblattella nahua* (Saussure). Porto Bello, Panama. Male. Dorsal view of distal portion of abdomen and cerci, showing specialization of fifth dorsal segment. (×5)

Fig. 16.—*Neoblattella fraterna* (Saussure and Zehntner). Gatun, Canal Zone, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×5.5)

Plate IV

Fig. 1.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Cephalic view of head. (Much enlarged.)

Fig. 2.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Dorsal view of wing. (×3.3)

Fig. 3.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Distal outline of tarsal claws and arolium. (Greatly enlarged.)

Fig. 4.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 5.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Lateral view of subgenital plate. (Much enlarged.)

Fig. 6.—*Lophometopum leptum* new species. Upper Rio Pequeni, Panama. Immature male. Dorsal view, showing distinctive color pattern in the immature stages. (×5.5)

Fig. 7.—*Ischnoptera nox* new species. Porto Bello, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 8.—*Ischnoptera rufa rufa* (DeGeer). Montego Bay, Jamaica. Male. Lateral view of specialized distal portion of titillator. (Greatly enlarged.) Specialization of this organ greater in *rufa occidentalis*, for which compare figure 9.

Fig. 9.—*Ischnoptera rufa occidentalis* Saussure. Pózo Azul de Pirris, Costa Rica. Male. Lateral view of specialized distal portion of titillator. (Greatly enlarged.)

Fig. 10.—*Ischnoptera rufa occidentalis* Saussure. Vera Cruz, Vera Cruz, Mexico. Male. Lateral view of sinistro-dorsal concealed genitalic shaft. (Greatly enlarged.)

Fig. 11.—*Ischnoptera gatunae* new species. Rio Trinidad, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 12.—*Ischnoptera inca* Saussure and Zehntner. Cabima, Panama. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 13.—*Ischnoptera mirella* new species. Porto Bello, Panama. Male. *Type.* Ventral view of subgenital plate, showing portion of specialized supra-anal plate visible from below. (Much enlarged.)

Fig. 14.—*Ischnoptera panamae* new species. Rio Trinidad, Panama. Male. *Paratype.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 15.—*Ischnoptera panamae* new species. Paraiso, Canal Zone, Panama. Male. *Paratype.* Specialized dextral portion of paired plate beneath supra-anal plate. (Greatly enlarged.)

Fig. 16.—*Xestoblatta immaculata* new species. Alhajuela, Panama. Female. *Type.* Dorsal outline of pronotum. (×3.3)

Fig. 17.—*Euphyllodromia angustata* (Latreille). Gatun, Canal Zone, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×7.5)

Fig. 18.—*Euphyllodromia decastigmata* new species. Gatun, Canal Zone, Panama. Male. *Type.* Dorsal view of pronotum. (×6)

Fig. 19.—*Euphyllodromia decastigmata* new species. Gatun, Canal Zone, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 20.—*Euphyllodromia decastigmata* new species. Gatun, Canal Zone, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×7.5)

Plate V

Fig. 1.—*Pseudomops gloriosa* new species. Cabima, Panama. Female. *Type.* Dorsal view of pronotum. (×5.2)

Fig. 2.—*Pseudomops gloriosa* new species. Cabima, Panama. Female. *Type.* Dorsal view of tegmen. (×2.6)

Fig. 3.—*Pseudomops gloriosa* new species. Cabima, Panama. Female. *Type.* Dorsal view of wing. (×2.6)

Fig. 4.—*Nyctibora noctivaga* Rehn. Jamaica. Male. Dorsal view of supra-anal plate. (Much enlarged.)

Fig. 5.—*Paratropes pinoganae* new species. Pinogana, Darien, Panama. Female. *Type.* Dorsal view. (×2.9)

Fig. 6.—*Audreia gatunae* new species. Gatun, Canal Zone, Panama. Female. *Type.* Dorsal view. (×2)

Fig. 7.—*Epilampra maya* Rehn. Porto Bello, Panama. Female. Dorsal view of tegmen. (×2)

Fig. 8.—*Hyporhicnoda reflexa* (Saussure and Zehntner). Ujurras de Terraba, head of Rio Ceibo, Costa Rica. Male. Dorsal view. (×2)

Fig. 9.—*Hyporhicnoda reflexa* (Saussure and Zehntner). Gatun, Canal Zone, Panama. Female. Dorsal view (×2)

Fig. 10.—*Lamproblatta albipalpus* Hebard. Cincinnati, Magdalena, Colombia. Male. *Type*. Dorsal outline. (×2)

Fig. 11.—*Lamproblatta albipalpus* Hebard. Cincinnati, Magdalena, Colombia. Male. *Type*. Lateral outline of caudal tarsal joints. (×7.75)

Fig. 12.—*Lamproblatta albipalpus* Hebard. Cincinnati, Magdalena, Colombia. Female. *Allotype*. Lateral outline of caudal tarsal joints. (×7.75) Compare with figure 11 for sexual differentiation, which is of specific, but not of generic value.

Fig. 13.—*Eurycotis pluto* new species. Porto Bello, Panama. Female. *Type*. Dorsal outline. (Natural size.)

Fig. 14.—*Pycnosceloides aporus* Hebard. Motzorongo, Vera Cruz, Mexico. Female. *Type*. Dorsal view. (×2.5)

Fig. 15.—*Panchlora minor* Saussure and Zehntner. Tabernilla, Canal Zone, Panama. Male. Ventral outline of apex of male abdomen. (Much enlarged.)

Fig. 16.—*Blattella germanica* (Linnaeus). Miami, Florida. Male. Dorsal view of abdomen. (×3)

Plate VI

Fig. 1.—*Phortioeca phoraspoides* (Walker). Cabima, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×2.2)

Fig. 2.—*Capucinella delicatula* new species. Porto Bello, Panama. Male. *Allotype*. Dorsal view. (×2)

Fig. 3.—*Capucinella delicatula* new species. San Lorenzo, Santa Marta, Colombia. Female. *Type*. Dorsal view. (×2)

Fig. 4.—*Holocompsa panamae* new species. Paraiso, Canal Zone, Panama. Female. *Type*. Dorsal view of pronotum. (×14)

Fig. 5.—*Melestora micra* new species. Paraiso, Canal Zone, Panama. Male. *Type*. Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 6.—*Buboblatta armata* (Caudell). Porto Bello, Panama. Female. Dorsal view. (×3)

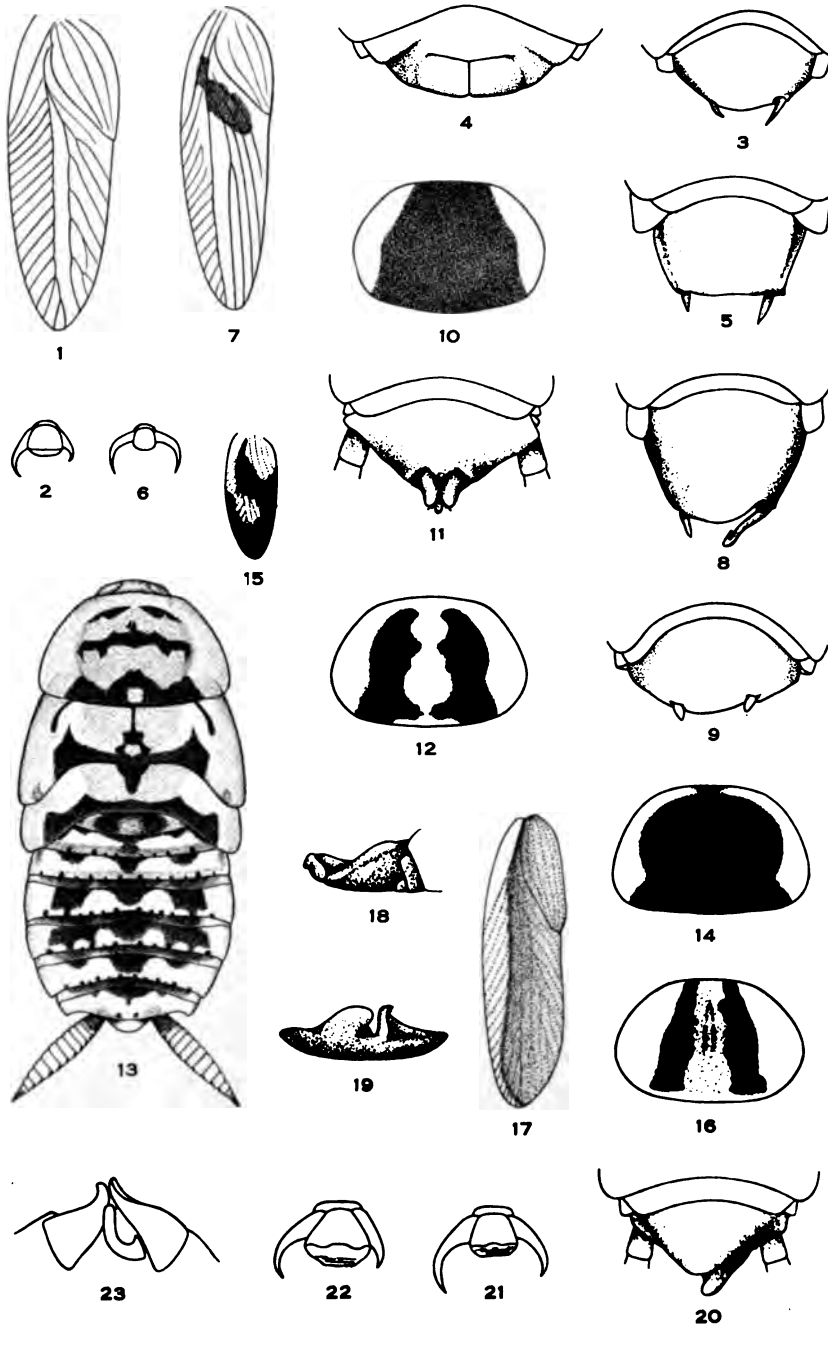
Fig. 7.—*Buboblatta armata* (Caudell). Porto Bello, Panama. Female. Lateral view of subgenital plate. (Much enlarged.)

Fig. 8.—*Buboblatta armata* (Caudell). Porto Bello, Panama. Female. Ventral view of subgenital plate. (Much enlarged.)

Fig. 9.—*Chorisoneura panamae* new species. Rio Trinidad, Panama. Male. *Paratype*. Cephalic view of occiput, showing characteristic markings. (Much enlarged.)

Fig. 10.—*Chorisoneura panamae* new species. Rio Trinidad, Panama. Male. *Paratype*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 11.—*Chorisoneura fuscipennis* new species. Porto Bello, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)



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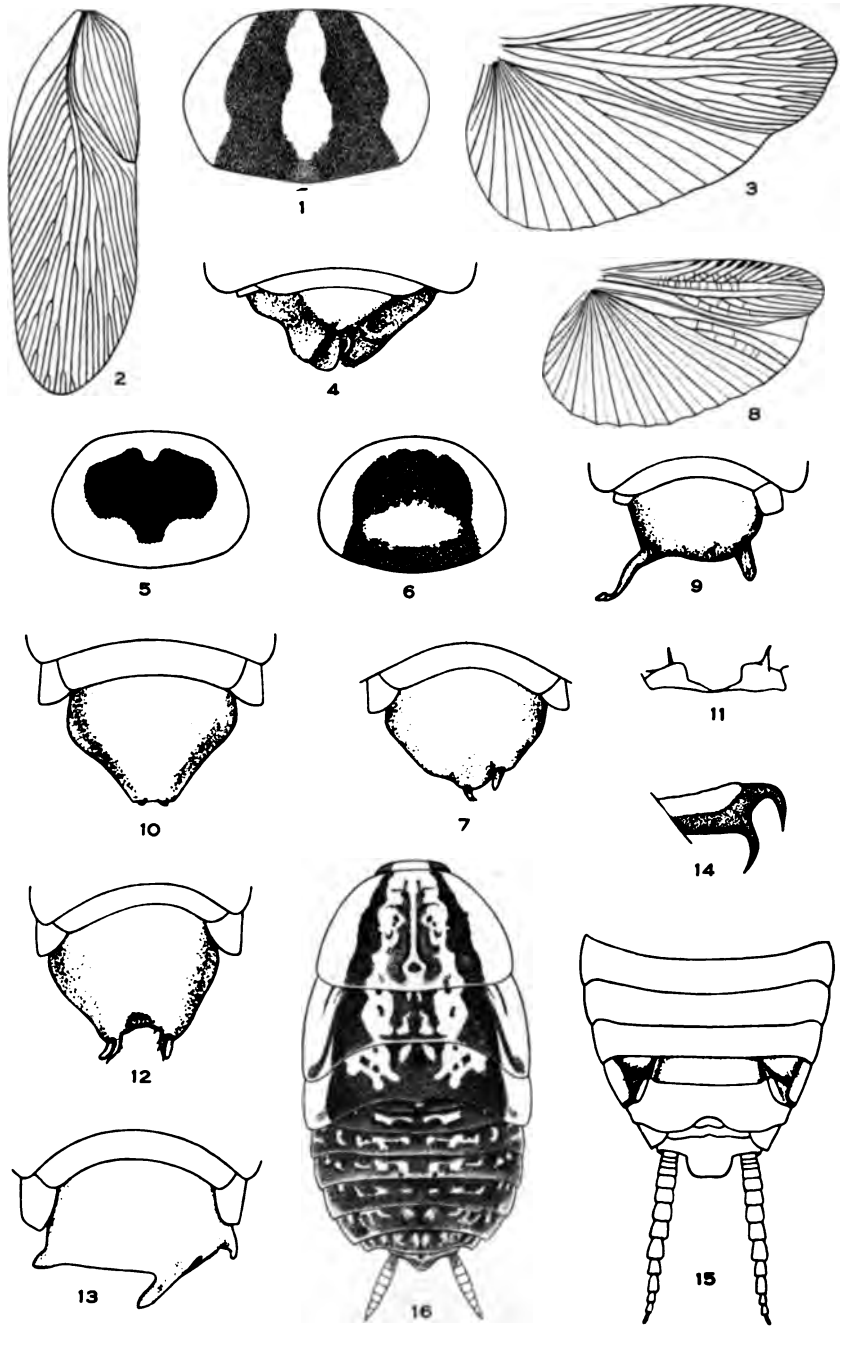

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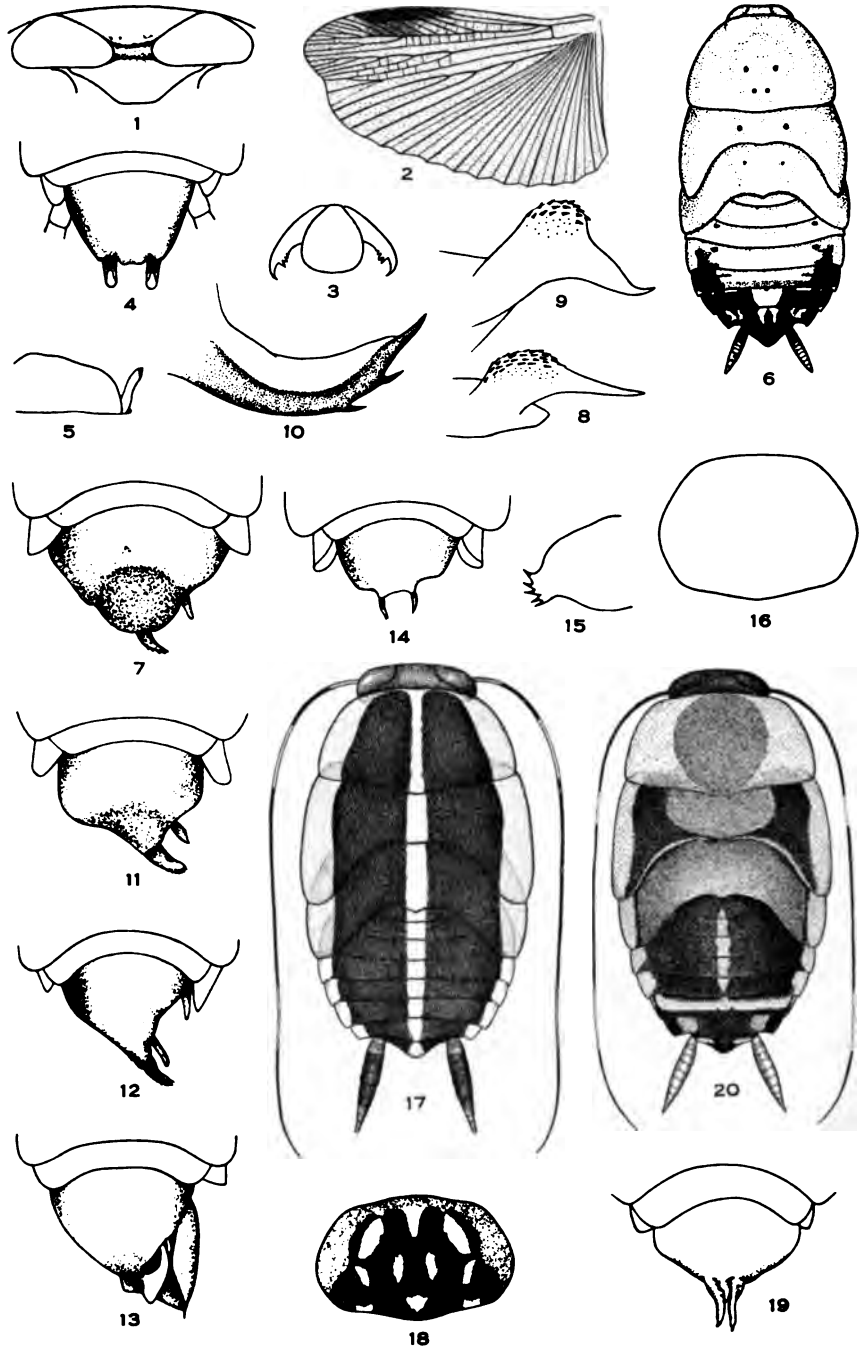

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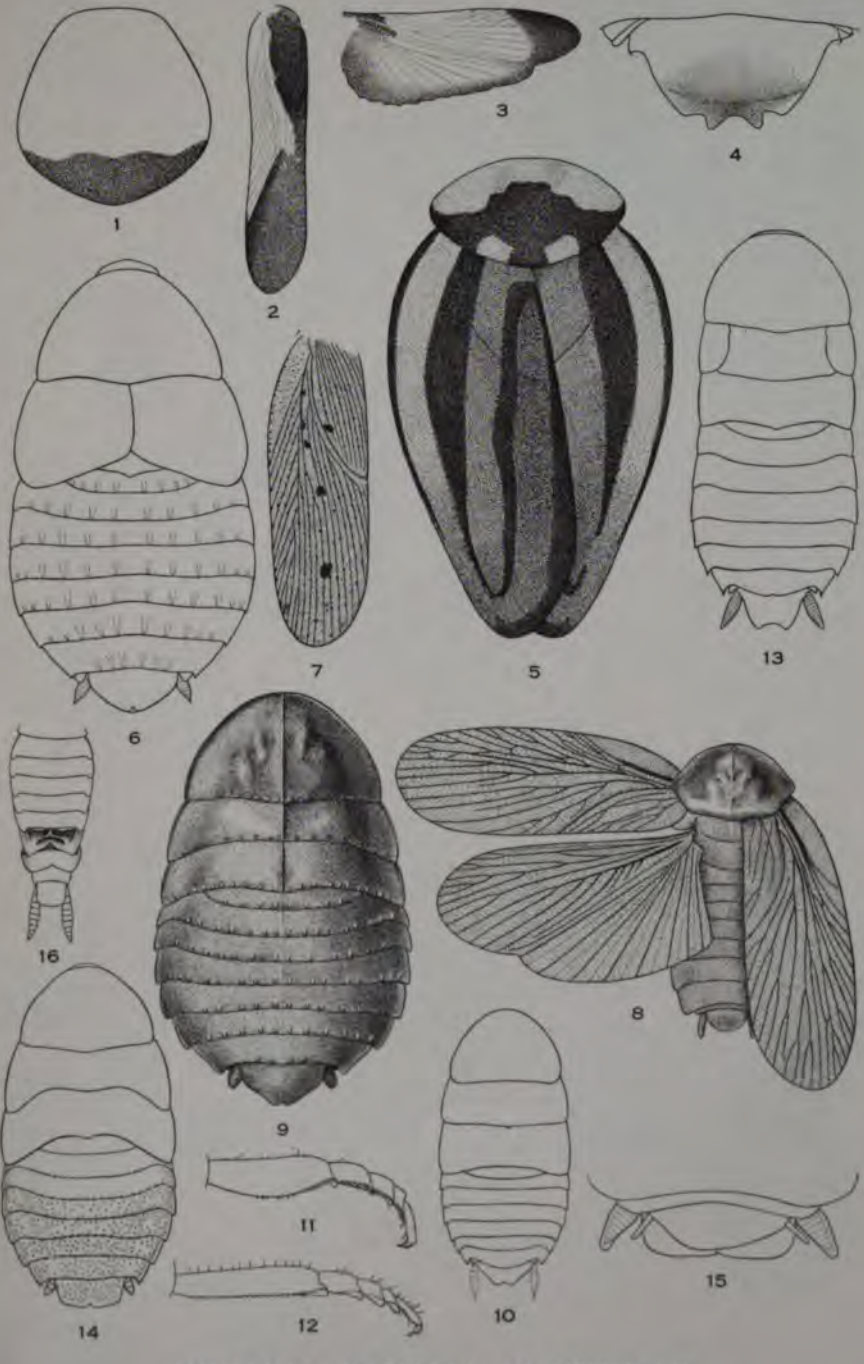

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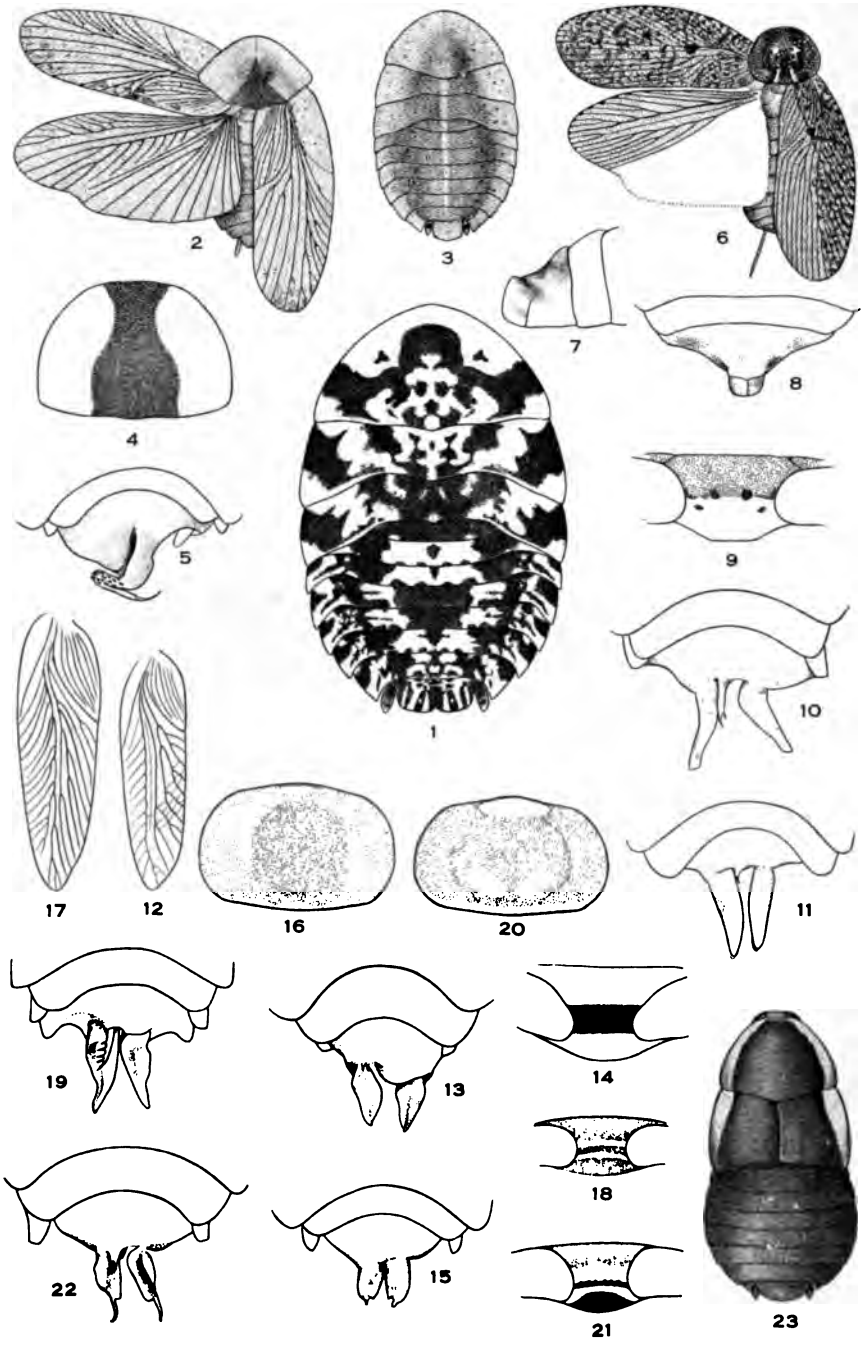

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WITH KEYS FOR THE IDENTIFICATION OF GENERA

BY

PHILIP A. MUNZ

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THE BLATTIDAE OF PANAMA

BY

MORGAN HEBARD

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